January 25, 1930 A McGraw-Hill Publication 25 Cents per Copy

AVIATION

The Oldest American Aeronautical Magazine

PRINCIPAL *Mergers* AND *Consolidations*

Bakelite AND *Similar Products* IN AIRCRAFT

REGULATING AIR COMMERCE—*Engineering*

AVIATION January 25, 1930, Vol. No. 28, No. 4. Published weekly by McGraw-Hill Publishing Company Inc. Tenth Avenue at 36th Street, New York, N. Y. Domestic $5.00 per year. Canada and Mexico, $6.00. Foreign and South America, $6.00 a year. All other countries, $8.00. 25 cents a copy. Entered as second class matter July 21, 1928, at the Post Office at New York, N. Y., under the Act of March [illegible] 1879. Printed in U. S. A.

AVIATION

The Oldest American Aeronautical Magazine

EDWARD P. WARNER, *Editor*

JAMES H. MCGRAW, JR., *Publishing Director*

Contents for January 25, 1930

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COMING

Airplane photography in Alaska ¶A description of the Curtiss-Chicago Airport ¶The duties and responsibilities of the aircraft factory foreman ¶Coming descriptions—the Curtiss Condor, the new Keystone-Loening Amphibian, the Savoia-Marchetti amphibion

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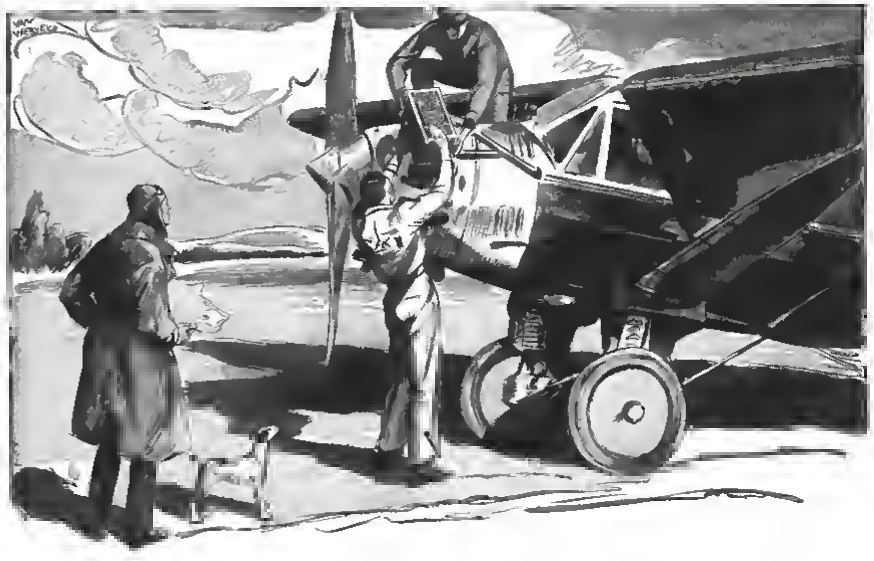

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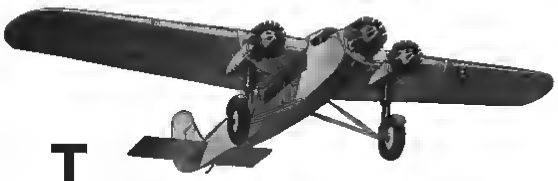

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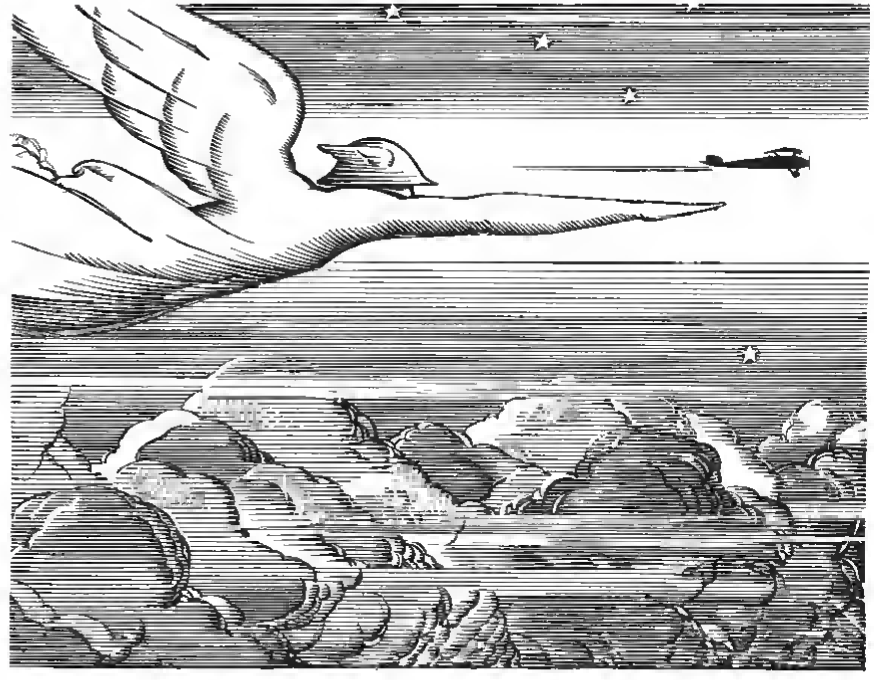
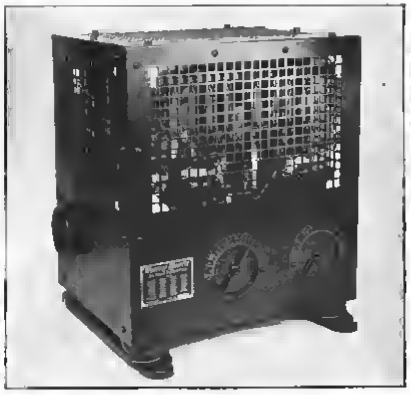
WHAT HAPPENED IN 1929



LAST month ended Aviation's greatest year. This month starts one still greater. Wright's part in record-breaking 1929 is significant. Here are a few achievements which bear this out and which will set Wright's pace for the year ahead. ENDURANCE: the "Question Mark," the "Fort Worth," the "City of Cleveland," and the "Angelino." DISTANCE—over sea: from America to Spain with Williams and Yancey. DISTANCE—over land: Coast-to-Coast non-stop round trip with Mamer and Walker. ADAPTABILITY: 80% of possible prize money at the Cleveland Air Races. SPEED: 229.8 m.p.h. with Douglas Davis. EFFICIENCY: 7 out of 10 first places in the Ford Reliability Tour. STAMINA: to the South Pole and back with Admiral Byrd!

WRIGHT
AERONAUTICAL CORPORATION
PATERSON, NEW JERSEY

Pilot's telephone equipment for open cockpit planes.



8A Radio Transmitter.

Silencer type microphone for cabin planes.

Airplane Telephone
makes flying more reliable!

WESTERN ELECTRIC airplane radio telephone equipment keeps pilots in constant communication with the operations manager and his dispatchers on the ground. It helps to bring planes through *on time.*

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Facts about the radio telephone transmitter

The Western Electric 8-A Transmitter is a small, rugged unit (16⅝" x 12" x 14"), weighing approximately 30 pounds without power supply. Designed for remote control, it may be installed, in any part of the plane. All parts are readily accessible for inspection. Other details —50 Watts power output; 100% modulation; frequency stabilized by quartz crystal controlled oscillator, frequency range 6000 to 1500 kilocycles; power supplied from either engine or wind driven generator or from battery and dynamotor

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Extensive tests have been made in landing with one and both Airwheels flat—and even with holes cut deliberately in their side walls—no trouble was experienced in handling the plane.

Airwheels have a streamline shape—wind tunnel tests indicate that they reduce wind resistance.

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Everything in rubber for the airplane

AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGRAW-HILL PUBLICATION ESTABLISHED 1916

EDWARD P. WARNER, *Editor*

VOLUME 28 . . . *January 25, 1930* . . . NUMBER 4

The Postmaster General Speaks His Mind

THE SUSPICION that Postmaster General Brown is inherently unfriendly to aviation, and desirous of finding some secret means of stifling the air mail, cannot survive a careful reading of his recent address before the Cleveland Chamber of Commerce. He even implies regret that he has not the legal authority to revise contract rates upwards in some cases. He has approached the problem as a business man and with the desire to get it onto a commonsense business footing.

It is perfectly manifest that the present scale of compensation is absurd. Some companies are being generously overpaid by the measure either of the general average return or of operating costs, while others are in constant danger of financial starvation. The method of compensation itself is inherently unsound in that it has made everything depend upon ability of a prospective contractor to estimate far in advance the amount of mail that will be sent over a route without even knowing what competing and parallel lines the Post Office Department might later establish during the period of his contract. Even if the provisions of law did not compel a new negotiation of new rates in connection with any extension of the original four-year contract, experience has made it obvious that modifications both in rate and in method are necessary to do equal justice among the contractors.

The Postmaster General has made a concrete proposal, calling for new legislation. He suggests that the domestic air mail be put on the same status as that for foreign countries. He proposes that payment be made in terms of distance flown rather than of weight of mail carried, and that the payment per mile should vary with the load capacity which the contractor is required to have available for mail.

On this last point his address is a little vague. He says, "A schedule of compensations should be set up providing for the payment of perhaps thirty cents per mile for a weight space of one hundred pounds, with increased compensation per mile for increased weight spaces." The word "spaces" is full of confusion. It may mean that the compensation to be paid is absolutely fixed in advance and is dependent solely on the size of the airplanes used, or it may imply, what is far more reasonable from our view but seems less probable from the language chosen, that the mileage rate will be increased in proportion with the weight actually carried.

If the second interpretation could be taken as the correct one, we would find ourselves in virtually perfect agreement with the Postmaster General, but believing that the same result could be accomplished in another way and without new legislation. The sliding scale already employed between New York and Chicago furnishes the answer to the problem. Compensation can perfectly well be paid in terms of poundage if the rate is varied with the load actually carried on each run. Manifestly, there should be no maximum limit upon the amount of mail that may be turned over to the contractor. Those who purchased air mail stamps and affix them to their letters will determine that point. Manifestly, also, there should be no removal of the incentive for the contractor to go out and solicit mail business. The air mail has been built up to its present dimensions in large part, to be sure, by the campaigns made by the

Post Office, but they have been valiantly supplemented by the Aeronautical Chamber of Commerce and other national aeronautic organizations and by the private endeavors of most of the contractors. The danger of indifference on the contractor's part if his payments are to be made on terms of mileage flown is clear. We have never believed, and do not believe now, that it would be in any sense impossible for an impartial board of experts on air transport, having nothing to do with any of the operating companies, to arrive at a basis of compensation on a scaled poundage basis, to take into account the probable amount of traffic so far as it could be foreseen, the inherent difficulty of the route, the probability of marked seasonal variations in demands on the service, and all the other factors involved, and to produce a formula that would be fair to all the contractors and that would hold out to the Post Office Department the hope of ultimate financial equilibrium.

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The Place for Unity

THE CENTER of gravity of aeronautical interest has located in Latin America. The air map of the United States has been far enough developed to permit that we turn our attention abroad, and our operators have looked first to the South. There they have met the French and the Germans, also reaching out for a foothold, while Briton, Spaniard, and Italian look on with quiet but none the less keen interest. In those millions of square miles of territory of the Western Hemisphere in which Spanish or Portuguese is recognized as the mother tongue the foundations of a bitter international rivalry are being laid.

Competition is assured. It will not be merely international. Already two American companies have reached the same terminus, and their plans call for an extended paralleling of each other's routes. Competition in itself is to be welcomed, not feared, but it should be a constructive competition. It should not exclude cooperation. It should take the form of a rivalry in improvement of service, not of mutual attack by ruinous rate-cutting, by circulation of rumors, or by political intrigue.

These observations stand internationally as well as between nationals of the same state. The cry of patriotism is now and again raised to rally all hands to the laudable effort to trample the foreigners into the dust. Unfortunately, to put the case upon no grounds more altruistic than those of pure self-interest, the process of destroying foreign competition by direct assault is likely to involve the incidental destruction of the business over which the competition is being waged. The foreign competitor is here, and he could not be excluded by ignoring him.

The crossing of an international boundary does not suspend the operation of economic laws. The financial success of an air line in Venezuela or in the Argentine depends upon essentially the same factors as in California or Connecticut—to wit, the finding of an income sufficient to counterbalance the expenses of operation. Latin America has no large subsidies to offer upon military grounds, and the income must be truly commercial. The appeal to the passenger or shipper can be increased and the amount of business done increased pari passu, if all operators, French, American, German or whatever they may be co-ordinated their schedules and their traffic regulations and simplify the exchange of business as much as possible. Operating efficiency can be enhanced, and the day of economic self-sustentation can be brought nearer, by mutual agreement which will assure a reasonable balance of the load handled. For one company to have the contracts for the Northbound mail between two points and another for that Southbound, each line hypothetically carrying something approaching full capacity in one direction and running empty in the other, would be preposterous. It would be too wasteful to be endured.

Equally objectionable is the duplication or triplication of ground facilities. The doctrine of the municipal airport is not deeply ingrained in the republics of Latin America. Operating lines have to create their own fields, lighting arrangements, radio services, and even weather reporting systems in many cases. The speed and efficiency with which some of them have proceeded to do so is worthy of the highest praise. But there should be vigorous effort to arrive at a fair basis for the common use of such facilities by all established and responsible operators. It is just as easy to go broke South of the Equator as it is "North of 53" or anywhere in beteween. There is no concession of weakness in a quest for economy, and there need be no surrender of competitive positions in an agreement among competitors not to build three airports to take care of a traffic that would impose only a light load upon the facilities of a single one.

There has been little ground for serious alarm as yet, but mistakes would be easy to make, and in the international field they are hard to retrieve. They will be avoided only if all concerned make up their minds that they will be as willing to work with their competitors as against them, and thereafter maintain a vigilant lookout for opportunities to join in undertakings for the general good.

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Forming Travel Habits

AT LAST America has air rates as low as rail rates, and in some cases lower. A western operator has recently lowered the one way fare between Los Angeles and San Francisco, California, to $21.50. First class train fare with lower berth pullman fare, taxi

fare and tips figured in, amounts to $26.50, or an actual saving of $5 for the man who rides the plane. Another company, in the central southwest, has undertaken to match the railroad fares dollar for dollar. Admittedly these rates cannot pay the operators of the air lines a profit at present and some interesting conclusions develop.

The first and most important is that such radical rate slashes prove to us that air transport as operated at present has not yet proved an economic success. People will not pay more than a definitely limited premium to ride the air lines, and our only hope is to increase traffic, install larger equipment, run on more frequent schedules, and thereby so reduce overhead as to make a profit possible at the lower rates. Aviation is still seeking to supply proof that the transportation of persons by air is a sound business operation.

The recently reduced rates, in California and other parts of the country, have stimulated traffic healthily, but there has been no overwhelming rush to ride the air lines. Granting the added convenience of travelling more rapidly by air and the great saving in time and money to business men that is thus accomplished, it is still apparent that those who travel are so in the habit of doing so by boat, bus, or train that even when money can be saved by taking to the air the air lines must be prepared to continue for an appreciable period of pioneering at some risk and sacrifice before such traffic may be expected to grow at a proper rate.

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Mutual Protection for Pilots

THE AIR is full of rumors of pilots' unions. They are being talked of in the East, upon the Pacific Coast, and in the Middle West. Professional organizers are busy in the field.

So far as we are aware these are the first explicit attempts of them. There have been pilots' associations of various types. There have been airplane pilot strikes, but those have been informal and local, and have been settled without creating lasting rancor. The present proposals, vague though they are, point at something distinctly novel in the way of organization.

We do not estimate that an organization in union form can do any particular harm, whether it does any good or not, except that for a time it might waste a certain amount of money for its members if unwisely administered. Airplane pilots taken as a whole, especially those who have attained the dignity of positions with transport lines, are far too intelligent to remain with any association which does not actually serve their interest, and they are well able to protect themselves against the machinations of self-seeking walking delegates—if that term can be accurately applied to anyone concerned with flying.

Can a union be helpful? The answer depends upon exactly what is meant by a "union." A professional organization for the development and maintenance of professional standards and for the exchange of information on professional problems is of unquestionable benefit. There should be some organization to represent the collective opinion of the great body of airplane pilots in dealing with such matters as the standards enforced by the Department of Commerce.

Such an organization, like an engineering society or an authors' league, inevitably concerns itself to some extent with the relationship between its members and their employers. It would be very properly concerned if any employer were insisting that pilots adopt courses either unethical or dangerous, but that is not all that the term union connotes to the understanding of the average man. He thinks under that title of an association concerning itself primarily, if not solely, with the improvement of wage levels and labor conditions.

The labor union movement in industry has derived much of its strength from, and rests its logical case largely upon, the comparative lack of flexibility of labor as a commodity. The working man finds it no easy matter to drop his employment in one town and take it up in another, perhaps in a remote city. He has difficulty in informing himself upon the conditions there. Fearing that he may be turning to unknown evils worse than those so far experienced, he clings even to unsatisfactory employment, and seeks an organization to make it better.

The pilot of an airplane is in a very different case. By the nature of his employment he is widely traveled. From the intelligence and alertness that that employment requires, it can be taken for granted that he keeps in touch with conditions away from home. The turnover in his employment is rapid enough, especially at the present time when the demand for pilots is steadily increasing, so that any general wage-cutting policy would have a disastrous effect upon the available supply of flying personnel upon whom the operating companies depend. Finally, the qualified pilot has a half a dozen different fields of employment open, and there is free interchange between transport flying, piloting for private owners, teaching, and various brands of aerial service.

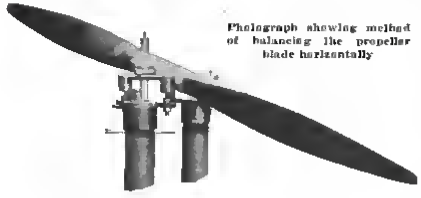
There need be no need for a union. If widespread demand should arise for a militant organization to uphold the pilot's interest, the operators of aircraft would almost surely have themselves to blame. Anything in the way of industrial blacklisting, or of widespread agreement to depress wages arbitrarily, or of taking advantage of the necessities of individual pilots, would be the seed from which counter-action would be sure to grow. The two parties can work in perfect harmony and settle their relations in direct negotiation if the pilot and his employer both take harmony as a fundamental aim. The pilot is not merely a hired man in a virtually fixed status. He is a vital part of the operating organization. Its success is his success, and in many cases he is an executive in the making.

THE AERONAUTICAL USES OF *Bakelite* AND *Similar Products*

By JOHN F. HARDECKER

BAKELITE is a synthetic product formed from formaldehyde and phenol or carbolic acid. By a special process, carbolic acid and formaldehyde react to form a resin-like material which is both soluble and fusible—but which has the distinctive property of becoming insoluble, infusible and very hard, strong, and resistant, after being subjected to heat. In the pure form it is transparent and amber like in appearance, and is known as Bakelite Resinoid. Though Bakelite is a component part of many products such as varnishes, lacquers, enamels and cements, the airplane industry is concerned primarily with its use in the form of Laminated Bakelite.

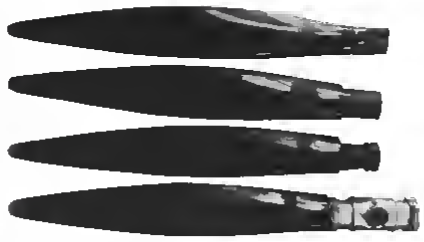
Laminated Bakelite is the laminated product resulting from the processing of certain grades of fabric and paper with this resin like raw material. Laminated Bakelite products, in the form of sheet, rod, tubing and molded products are made under the following trade names: Micarta, Celeron, Formica, Fibroc, Textolite, Dilecto, Phenolite and Spaulding Bakelite. Micarta contains paper or cloth, Celeron is made of layers of impregnated woven



Photograph showing method of balancing the propeller blade horizontally

fabric. Fibroc is Bakelite mixed with asbestos, and Dilecto is a product using Bakelite and sheets of tough paper.

Laminated Bakelite is non-hygroscopic, tough, strong, resilient, resistant to heat, cold, acids, chemicals, fumes and high electrical voltages. As it is chemically inert, it does not deteriorate with age. Being a laboratory product, it is uniform and can be held to a given standard for any particular purpose. It is also extremely light in



The progressive stages of the machining process which is done in a lathe on each of the separate halves

weight, with a density approximately one half that of aluminum, yet moisture, grease or oil cannot warp or mar it. Its resistance to heat, cold, rain, ice, snow and salt air make it ideal for aeronautical use. It is extremely wear resistant, and makes silent contacts when used with moving parts.

WHILE it is used in all forms (sheet, rod, tubing and molded) in the aircraft industry, its greatest current application is in the form of molded micarta parts. Thus used, it plays a significant part in aeronautical production. Therefore it will be well to consider these molded applications in detail, before proceeding with the aeronautical products manufactured directly in the airplane plant from sheet, rod and tubing.

Micarta propellers are constructed of a specially woven cotton fabric impregnated with the phenolic resin and formed in a mold under heat and pressure to exact size. Broadly, two processes are used in the manufacture of these propellers; the process of molding and the process of machining. The molding process forms the exact shape of the blade, and the machining process prepares the inner ends of each blade for attachment to a steel hub, which is in turn securely held onto the end of the tapered crank shaft of the airplane motor. Centrifugal force caused by high rotative speed, and severe vibration

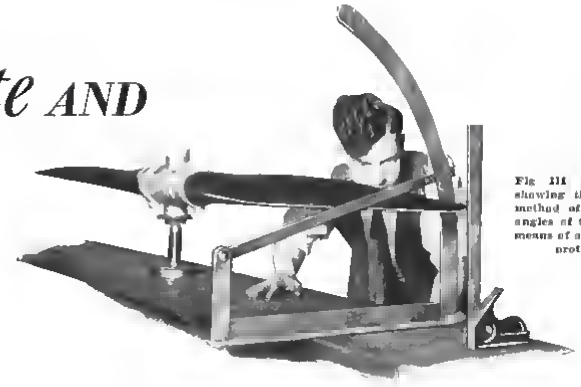


Fig. III. Photograph showing the simple method of setting the angles of the blade by means of an adjustable protractor

common to such service, require that extreme care be exercised throughout the manufacturing process to assure uniform and high grade material, perfect balance of the blades, and perfect fit of the blades to the hub. Obtaining this uniformity and accuracy of manufacture with a product of such irregular shape presents some problems interesting both to the die-maker and to the machinist.

IN the manufacturing process here described it is first necessary to impregnate the fabric with the synthetic bond. This is done by running the fabric through a vat of liquid bond at a specified speed, and thence through a drying oven. This impregnated fabric is then placed in a highly polished, steam heated mold made of bronze, and is formed into its final shape by the application of several hundred tons of pressure applied for several hours. The bronze mold is divided into three sections, two of which remain attached to the press when the propeller is removed, and the third of which is removed from the press with the propeller. The part of the mold which is removed from the press with the propeller is the center portion used in molding the heavy part of the propeller. Both the upper and lower blocks are removed with the propeller after which the blocks are detached. Before the laminations for another propeller are placed in the mold, the mold is polished thoroughly, the high polish of the finished propeller depending on the polish of the mold.

The propeller is next sawed in two through the center and the two separate blades are sent to the machine shop. Fig. I shows the progressive stages of the machining operation, the work being done in a lathe in two stages. The blade is then set up in a lathe ready for the rough machining operation. The final process consists of machining the hub end of the blade to fit the steel hub already referred to. When the blade is machined, a hole is drilled in the end to be used for fine adjustment of balance. This is necessary to balance the blade horizontally.

In balancing the blade horizontally, it is placed in a balancing machine (Fig. II). In place of a second blade a fixture is used which exactly compensates for the cor-

The airplane manufacturer, due to the workings of the inflexible law of minimum weight for maximum strength, must of necessity study each detail of his design not only in terms of dimensional proportions, but also as to the material or materials best suited to each particular purpose. This naturally requires an exactitude of knowledge extending into the intimate technical refinements and possibilities of each material, and generally requires continual detail material study, even after a given basic plane design has been established. Among the most interesting of the newer materials which are finding increasing application in aircraft manufacture are Bakelite and the other synthetic resin products made from it. ¶In the accompanying article Mr. Hardecker deals in detail with Laminated Bakelite in the form of molded micarta parts, Bakelite Resinoid products, miscellaneous molded products, and the methods of utilizing and working Laminated Bakelite.

rect, predetermined weight of a single blade The blade and fixture are set in a horizontal plane and balance is obtained by adding or removing weight to, or from, the drilled hole. To check the vertical balance of the complete propeller, two matched blades are set up in the balancing machine.

The method of setting the angle of the blades is very simple (Fig. III). The blade is pivoted to a vertical axis on a carefully leveled table, and the angle is set by the use of an adjustable protractor. This angle is set across the flat side of the blade at a specified gage point When the angles of both blades are set, they are firmly fixed to the steel hub, and the complete propeller is ready for test and shipment (Fig IV)

Fig IV—The completed propeller ready for shipment

The high efficiency of these propellers is due to their thinness and the aerodynamically correct form that can be realized These blades are tipped in order to stand a maximum of abuse Moisture, salt spray or oil has no effect on them, and sand or stones will not splinter them Because of the resiliency of this material, there is no tendency of the propeller to crystallize Change of temperature and humidity has no effect upon their material

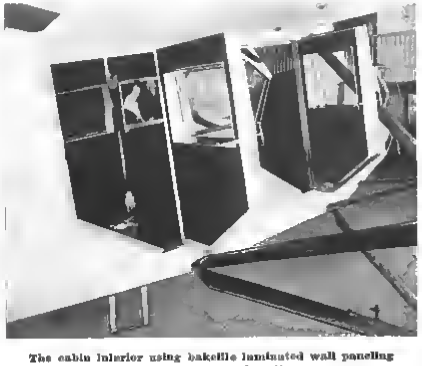
One of the desirable features of these propellers is the possibility of changing the blade angle, and so the pitch, by means of the clamp rings Adjustments can be made with an ordinary wrench A low pitch setting will allow the engine to turn up fast permitting quick take-off This is particularly desirable when leaving a small field A high pitch setting can be used if it is desired to hold the engine speed down at full throttle for fuel economy It high cruising speed is desired, the blades can be given an intermediate setting These propellers have a marked scale on the hub to allow pilots to change the pitch on the field.

These propellers, because of their fibrous construction, absorb vibrations due to thrust and torque irregularities. They are, therefore, especially desirable on planes having multiple engines with overlapping propellers, or where there are other obstructions to the slip stream which cause fluttering The absorbing of vibrations leads to another desirable characteristic—quietness Due to the low density of their material, a propeller for a 150 to 210 hp engine weighs only 54 lb

Micarta airplane pulleys, contributing to the success of practically every outstanding aviation feat during the past few years, have been adopted as standard equipment by commercial aircraft manufacturers on the basis of safety, light weight and low cost They have been adopted as AN and SAE Standards for aeronautical use

These pulleys cause less wear on the guide cables than pulleys made of other materials This feature results in a decrease of cable replacements and in a greater factor of safety In addition these pulleys do not develop the flat spots so common to metal types. Self lubricated bearings are molded into the pulleys, thereby eliminating the need for lubrication They are available in a wide range of sizes, suitable for every aeronautical need

Micarta fairleads are designed to guide the control wires in planes They prevent wear on the cable which otherwise would drag on the frame cross-braces, etc The fairleads consist of two halves, set in a metal bracket, and which are wired together with a simple turn of soft copper wire This permits of the replacement of worn or broken fairleads without the necessity of disconnecting the control cable. They are available in two sizes, which cover the normal range of control cable diameters



The cabin interior using bakelite laminated wall panelling for the doors and walls

One of the most recent developments of these phenolic products is the molded tailwheel made from a laminated fabric base material that is particularly well suited to withstand the severe service to which tailwheels are subjected. These tailwheels are extremely strong and light One style, weighing approximately 4 lb, is fitted with a self-lubricating bearing, while another style is furnished with a bronze bearing designed for the usual type of shaft lubrication in which grease is introduced to the bearing through the shaft

Hinge bearings are made with a finely divided duck material as a base. They are provided with self lubricating cores similar to those used on the airplane pulleys These micarta hinge bearings are used for rudder, elevator and aileron bearings as a substitute for metal They are lighter than the ordinary metal hinges and are very strong mechanically.

Bakelite resinoid, the original transparent Bakelite material is also used to a limited degree for airplane parts The Keystone Aircraft Corporation uses this material in making its sight gauge because the pleasing amber color eliminates glare and eyestrain, is very durable, and can be machined and assembled more satisfactorily than glass Control stick handles of richly colored Bakelite Resinoid are used to lend a distinctive touch to the decorative scheme.

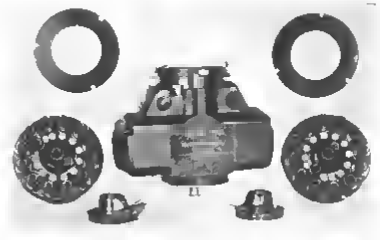
While many of the preceding fabric base airplane products described in detail were molded products, there is another class of general molded products which find aeronautical applications These employ the original resinoid to which are added such fillers as wood flour for general use, asbestos for heat resistance and graphite for dry bearings Metal pacts may be embedded in the molded piece at the time of molding, thus saving much labor and

expense over the method of assembling this work by hand.

Model Bakelite is used in aircraft engine magnetos for distributor blocks, distributor heads and rotors, caps and spools. Pump gears, etc., are made of molded bakelite, and the gear stock is available in molded blanks It is also used for the knobs on engine control lever units Molded Bakelite is finding increasing application for aircraft instrument cases, and one manufacturer uses it to replace the former metal casting of his ball bank indicator.

The airplane manufacturer finds a multiplicity of applications of laminated bakelite in parts manufactured at his own plant While these uses are not as significant in toto as the molded products, they indicate a range of possibilities which is constantly being added to, as this material becomes better established in the aeronautical industry.

Laminated Bakelite has been found exceptionally well suited for use as a lining for cabins and cockpits, since it is sound proof, dense, impervious to moisture, fire resistant and available in several colors It has been used to a limited degree in fuel systems, for machined tank caps and flares for tube fittings Bakelite tubing may also be used as a sleeve on fuel lines in the way of control wires, being taped in place to serve as a rubbing strip to resist possible vibrational contact.



Bakelite moulded parts used in type 80 No. 2 18 cylinder Scintilla magneto

Due to its properties as a non-conductor of electricity, Laminated Bakelite is machined to various forms as insulators, junction blocks, spacers, etc., in electrical and radio installations In internal wing antenna installations, it serves both as an insulator from the metal construction, and as a spacer for the antenna wires It is used for radio panels, and other insulating purposes in airplane radio installations, as well as in the original radio sets and radio beacons furnished by radio manufacturers.

Laminated Bakelite is machined to various special shapes for use as spacers and fillers in metal plane construction. It may be used as spacers in metal wing construction, and in places in the structure where two plates join in such a way that the included angle is too small to permit riveting in the individual plates, and it is necessary to provide a filler for through riveting. Bakelite blocks have been used in metal hull construction for water tightness by insertion in the longitudinal channels at the water-tight frames They are used for this latter purpose because wood blocks would invite corrosion by contact with aluminum alloy, while aluminum alloy blocks would be of greater weight.

Laminated Bakelite is further used as fillers to develop greater bearing area, as in an elevator torque arm built up of aluminum alloy plates, using two metal faces approaching each other toward the end, with the Bakelite filler between. Streamline shaped separators have also been used to carry fuel lines and engine controls up a round brace strut, the entire assembly being encased with sheet metal formed around the streamline shaped separators Bakelite laminated washers, both plain and beveled, find a number of uses in airplane fabrication, and bakelite has been used for control wheels.

NO MATTER how desirable the other properties of a material, its ability to be worked and machined in the shop is of extreme significance to the airplane manufacturer in his choice of materials. Bakelite may be machined in the shop in a manner similar to metals, bearing in mind that good results depend upon a reasonable observance of any practice peculiar to Bakelite. The following detailed observations should be found helpful

Turning Bakelite is set up in the lathe in the same manner as is usual with metals, except for the caution that care should be taken in tightening up tubing in the chock to obviate the possibility of cracking, as it is more brittle than metals The use of a lubricant is not desirable, and whenever possible, it should be turned to size in a single cut In any case the finishing cut should remove $\frac{1}{8}$ in. because it is impossible to take a light cut and maintain a uniform diameter.

The piece should be turned at a peripheral speed about 25 per cent faster than that customary for cast iron It is generally advisable to use a wide nosed tool with a coarse feed The tool should have a large clearance, but no rake The tool should be sharpened frequently, as it is inclined to dull quickly.

Drilling & Threading Drilling is best accomplished with a fast feed and the use of high carbon steel drills without lubricant To make certain of a clean hole on the under side it is desirable to clamp the Bakelite sheet being drilled to a longer wood board at the point where the hole breaks through, thus eliminating any possibility of chipping. If the drill is properly ground, the hole will be true and smooth but about .003 in. undersize Drills should be ground slightly off center if the hole must be the same size as the drill The life of a drill before regrinding is highly variable, but it should not exceed a half hour For sheets of $\frac{1}{4}$ in. drill speeds may range from 2 500 to 10,000 r.p.m To prevent excessive heating of the drill it should be withdrawn quickly from the material. Several drill manufacturers are now making drills especially for Bakelite work They are provided with extra clearance on the edge of the flutes to reduce friction and prevent over-heating

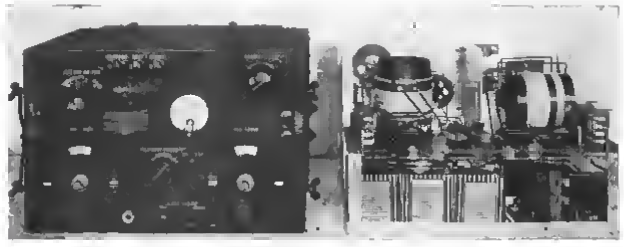
Bakelite control stick handles as used on several types of planes

It is possible to use an ordinary countersink, but due to the rapid wear and difficulty of re-grinding, a modified drill may be used to greater advantage. The drill should be ground to the proper angle for countersinking with very little clearance For threading, ordinary taps and dies are suitable, using lubricant, as with metal.

Sawing In using band or circular saws, the same

speeds should be used as for hard woods or fibre, with the caution that saws must be sharpened and reset often. Circular saws should be made of hard steel, just soft enough to permit of filing. Number of teeth and amount of set should be governed by the smoothness of the cut required. For extremely smooth edges saws should be hollow ground, and should be used without set.

Needs of the work will dictate the frequency of sharpening. In stock of certain grades and thickness, a band saw will cut effectively for two hours, and a circular saw will need re-sharpening after twenty minutes. Where a large amount of sawing is done, a filing machine for each bench will be found a great convenience and time saver.

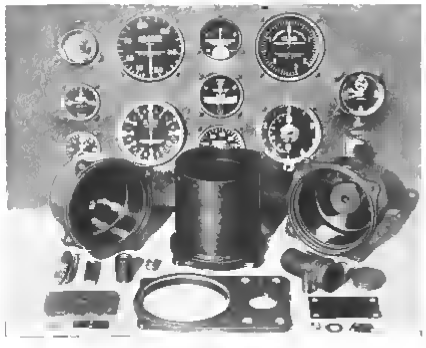


Radio set used on Byrd transatlantic flight showing use of bakelite in knobs and coil forms

For straight cuts a band saw width of one inch is most desirable—for scroll work, ¼ in. width. The usual band saw has a 36 in. diameter wheel, and should run at about 4,000 linear feet per minute, or from 350 to 500 r.p.m. at 5½ points per inch and 19-gauge thickness is usual.

The standard circular saw used is of 10 in. diameter working at 2,500 r.p.m.—on stock 1 in. or less in thickness. For greater thicknesses larger diameters up to 16 in. are employed. A 16 in. saw runs at about 1,500 r.p.m. For general use a 14 in. saw, thickness from ⅛ in. to 1/16 in., with 110 to 120 teeth and turning at a speed of 2,500 r.p.m., is recommended. On thin material a coping saw can be used to advantage in the same way that it is used for wood. The saw will usually be good for only one cut-out. Hack saws may be used the same as in any metal.

Where an exact cut-out of irregular outline is to be removed from heavy sheet Bakelite, it may be preferable to use the practice for making small steel templates in lieu of sawing. This consists of scribing the outline on the sheet, drilling successive holes closely spaced just outside the outline, and then breaking it out successively between holes by the use of a wood chisel. The part is then finished by hand filing, or on the filing machine.



Bakelite insulating material used in Pioneer aircraft instruments

Milling and Planing. In milling, high speeds and coarse feed are desirable so that the cutter throws the chips away from the work. Wherever possible, it is advisable to remove all the material in one cut. Side milling cutters are advisable in the interest of proper clearance. Oil will prevent the burning of tools, but is not always necessary. The cutting angle of the mill, if ground with a slight rake, will give better results. As in the case of milling, so also in planing, a high speed and coarse feed should be used. A deep cut, not less than 1/16 in., should be taken.

Bakelite moulded knobs used for engine control lever ends

Punching and Shaving. A plain punch and die may be used on stock up to ¼ in. thickness. Dies must be kept sharp and minimum clearance allowed between punch and die. For best results, the material should be heated thoroughly and uniformly in an oven or on a steam table to a temperature of 280° F. It is frequently convenient to locate a steam heated table beside the punch operator.

Sheets between ¼ in. and ¾ in. in thickness should be blanked and then finished in a shaving die. The work should be heated and oiled. Edges of the shaving cutter should have a slant of about 45 deg.

The shaving operation is not recommended for preparing discs from heavy stock. It is preferable that they be sawed and then turned on a lathe. The shaving operation on thick stock has a tendency to "delaminate" the layers and so weaken the structure.

Shearing. Bakelite Laminated, which is to be sheared, should be heated (120° F. to 300° F., depending on grade), to prevent checking in at the edge. Since there is difficulty in holding the heat in thin stock, during the transfer from heating plate to press, it is well here, as in punching, to have these units closely adjacent.

Surface Finishing. A dull surface finish for ornamental purposes can be accomplished satisfactorily by rubbing with pumice stone cloth, and finishing with oil. A dull mat finish can be secured by rubbing with No. 0 emery cloth, and finishing with No. 00 of the same material. The use of sandpaper in place of emery or carborundum is desirable for radio parts, because particles of the latter materials might adhere and effect the electrical properties.

DETERMINING THE *Effect* OF *Lightning* UPON THE AIRPLANE

By Walter E. Burton

The effect of lightning upon an airplane in flight is a subject about which very little has been said or written. At present it is still very much of a problem, and one demanding satisfactory solution and remedy, if the confidence of the air passenger is to be obtained.

In an endeavor to seek out the "mysteries" of that problem, chief engineer of the Ohio Insulator Company, Barberton, Ohio, Arthur O. Austin, is now conducting a series of extensive tests with man-made lightning. The nature of Mr. Austin's tests and the equipment that he is using are covered in a most interesting way in this article.

Lightning . . . word is becoming increasingly important in the aviation world. To the pilot, it signifies something to avoid. To the passenger, it labels one of the possible hazards he faces when making a trip by air. To the airplane manufacturer, it represents a kind of mysterious factor which he probably ought to take into consideration when designing a plane, but usually does not, except to comply with regulations governing bonding. To the airline operator, the word has a dollars and cents meaning, for one disaster in which lightning is reported to have played a part, whether it did or not, is almost certain to result in a loss of business, for a time at least.

The thunderstorm is admittedly a region to avoid today, yet air travel of the future will not be interrupted by storms as it is now. Of the two main sources of danger in a thunderstorm, lightning and wind, the former is likely to be feared the more, whereas the latter undoubtedly is the more dangerous.

But no one, at the present time, can venture to make a sweeping declaration concerning the part lightning plays in flying. There simply is not enough available scientific data to permit a definite statement as to the degree of hazard that lightning provides. There is almost no accurate information about the actual striking of a plane by natural lightning, although newspaper reports of some of the major accidents list lightning as the cause.

It is to seek an answer to the various questions that arise when lightning and its effect on the airplane are discussed, that Arthur O. Austin, chief engineer of the Ohio Insulator Co. of Barberton, Ohio, and consulting engineer for the Ohio Brass Co. of Mansfield, recently began a series of tests with "man-made" lightning.

The lightning-airplane tests are being carried out at the Ohio Insulator Company's outdoor high-voltage laboratory, located just outside of Barberton. It is the most powerful plant of its kind in the world. With the more than $2,000,000 worth of equipment available, artificial lightning bolts of more than 3,000,000 volts potential, measured to ground, have been generated. New equipment being installed at the time of writing will make possible production of even more powerful discharges. A spark of more than 3,000,000 volts pressure is nearly 30 ft. long, and the amperage of such a discharge runs into the hundreds of thousands.

In carrying on the work, the insulator company is working in co-operation with Popular Mechanics Magazine of Chicago, which suggested the tests and has provided a Barling NB-3 all-metal frame monoplane

as well as several other pieces of equipment Other planes and parts are to be lent by various manufacturers, and perhaps the Department of Commerce and other government departments.

The research has been thoroughly planned, in order that no major bone of contention in the lightning-airplane question will be overlooked Preliminary tests have been carried out with scale models of well-known air-

Model showing lightning entering tail and leaving a wheel of a model plane

planes, and with engines, wing sections, fuel tanks, ignition systems, tail assemblies and other parts of full-size planes Further experiments are being planned with full-rigged airplanes, set up and insulated in such a manner that actual flying conditions are almost duplicated In some of the tests, the engines probably will be running and the fuel tanks filled with gasoline, although preliminary investigation with smaller set-ups may prove this to be unnecessary or unwise

Problems to be studied are numerous It is to be proved conclusively whether or not an airplane can be struck by lightning while in flight Almost everyone has heard airmen and airplane experts of unquestioned authority declare that a plane cannot be struck by lightning while in flight While, on the other hand, others of equal authority maintain that it can Although records of tests have not yet been studied exhaustively, preliminary experiments with models indicate that a plane can be struck, and that it can deflect a lightning discharge and become a part of the lightning's path as it travels from cloud to cloud, or from cloud to ground The accompanying photographs show this clearly.

But, granting that a plane is struck, what is the effect on the pilot and passengers? Studies will be carried out to determine the probability of a shock to occupants of an open plane, a closed cabin plane and an all-metal job When a plane is flown near a charged cloud, it is in a strong electrostatic field. If a lightning discharge takes place, not necessarily striking the plane, this field suddenly collapses Mr. Austin believes that the collapse may subject the pilot to such a severe electrical shock that he may lose control of his plane, temporarily at least The passage of a lightning discharge through the air creates a vacuum The air, rushing into the evacuated region, causes the intense noise called thunder. Just what effect such a clap of thunder a few feet from a pilot and passengers would have, is another problem upon which data will be gathered.

The ignition system, especially the magneto, is considered a vulnerable part of an airplane from a lightning hazard standpoint But the ignition is not necessarily the part of a plane that will first be affected by lightning Tests on magneto set-ups and other electrical parts are being made to learn whether insulation is broken down, and what other failures are probable.

Several engineers and scientists who have studied the problem are inclined to believe that hot exhaust gases, because of their ionizing effect, create a path for lightning and serve to attract it to the plane. Mr. Austin, however, thinks that the gases from a plane in flight may become cooled so quickly that their ionizing effect is negligible He is planning experiments on running engines to learn the exact part such gases play. Measurements of the dielectric strength of the air in the vicinity of a running engine constitute the method of attack

THE FIRE HAZARD is one of the most discussed aspects of the lightning-airplane question It is not yet definitely known whether a gasoline tank will be fired by a direct lightning hit, whether the fabric covering of a wing will be ignited at the point at which a discharge strikes or whether the oil and fuel vapors in an engine crankcase constituting an explosive mixture, can be ignited through fusion of metal at a point of high resistance or through other action. All of these things are being studied in the Barberton laboratory.

Examination of the structural details of planes in common use indicates that the design may be such as to invite a hit at certain points For instance, it is thought that a bolt striking a tail surface may ignite the fabric covering, or may cause the control wires to

This synchronized camera is used for photographing artificial lightning The shutter is operated by a magnetic relay which in turn is tripped by a switch on the alternator. Duration of a flash is about one millionth of a second. The shutter operates at 1/50 second A data sheet is photographed simultaneously hence the two boxes.

fuse But it is quite certain that simple remedial measures involving perhaps a slight change in design and the application of only a pound or two of extra metal will provide complete protection Similarly, other structural hazards can be removed easily

IN ALMOST every plane there are joints in the metal parts, and at these joints, unless the bonding is unusually perfect, the metal can be fused instantly by the sudden passing of several hundred thousand amperes of current. Such fusing could have disastrous results, either through failure of the metal itself or by igniting surrounding material It is almost certain that the lightning investigations will result in a development of better bonding methods, and their application by airplane builders

But regardless of the exact nature of the findings of engineers, there is little doubt but that much will be learned that will enable manufacturers, users and operators to proceed less in the dark than in the past

The lightning hazard in ballooning is fairly well known, and several disastrous accidents have occurred to balloonists It was following such an accident that Ward T. Van Orman, internationally known balloonist, cooperated with Mr. Austin last spring to develop a method of protecting the passenger basket and possibly the bag itself from electrical discharges The resources of the outdoor laboratory were made available, and eventually a shielding system, consisting of copper cables suspended about the basket, was perfected by Mr. Austin, and used by Van Orman in this year's races. A similar method of protecting the gas-filled bag was worked out at the same time

As for rigid airships, having metal frames, there are several instances on record of Zeppelins having been struck by lightning. In some cases, there was a fusion of metal at some point in the skeleton where resistance was high. In only two instances were the airships set on fire when the hydrogen lifting gas was ignited by lightning. The bonded metal framework of a modern Zeppelin-type airship acts as a huge Farady cage, effectively absorbing and dissipating the lightning charge.

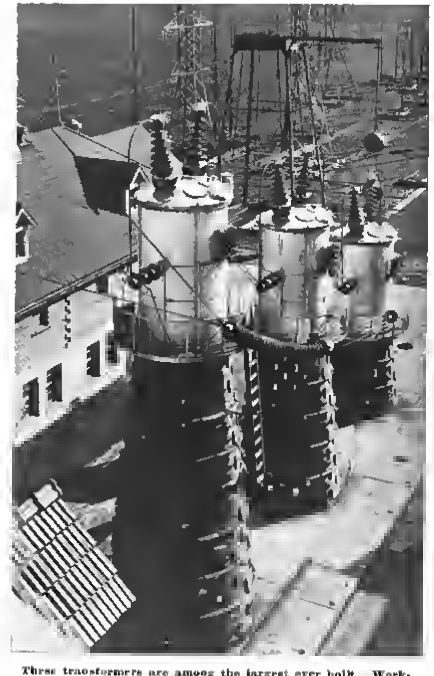
The laboratory itself deserves some comment It is the only place where outdoor lightning tests on full-sized airplanes can be carried out without the construction of a complete new laboratory. The plant is built on a portion of the model farm formerly belonging to the late O. C. Barber, one-time match king Some of the alternators, generators, switchboards and other equipment are housed in a chateau-like building that was originally designed as a cow barn In the courtyard stand three of the largest transformers ever built Each is tested to 900,000 volts, and the three working together can produce a spark of a potential exceeding 3,000,000 volts The units are arranged in steps on special porcelain tile basis The highest stands 50 ft above the ground From the high-voltage terminal a cage lead goes to a huge air condenser that is really a form of cage-type radio aerial The charge is stored on this cage until the discharge to the ground (which forms the other "plate" of the condenser system) takes place.

For measuring and controlling the voltage, four pairs of sphere gaps are available Each sphere, with its insulator, weighs over half a ton, and is 150 centimeters (nearly 5 ft.) in diameter—the largest ever constructed They were made by an electrolytic process, copper being deposited in hemispherical molds The metal is therefore nearly 100 per cent pure

Then there are a number of oscillators, ranging in size from 1 200 k v down each capable of producing a continuous spark discharge, the largest of which is many feet in length The laboratory includes the world's most complete collection of transmission line towers. These are used in almost daily insulator tests and investigations

At one end of the laboratory area there has been erected a system of wood poles, guys and insulators for suspending full-sized planes during tests A Ford tri-engined plane can be handled easily A grove of trees to the south and west reduces the intensity of the prevailing wind, making use of the sling less difficult It is also necessary to have comparatively calm weather for operating the lightning factory because a high wind will blow the discharges to one side

Adjacent to the laboratory is a large, level field in which the largest plane can land or take off. Ditches are being filled and suitable flags, a wind sock and other



These transformers are among the largest ever built Working together they produce artificial lightning of 3,000,000 volts potential.

markers placed so that the field can be used as a temporary landing area for the accommodation of visiting planes during the tests

The research has been in progress for several months, and probably will continue through the winter Conditions of weather will determine, to a considerable degree, the exact time required. Indications are that many valuable facts leading to greater safety for the flying public will be disclosed

Mergers AND Consolidations

DURING the year of 1929 the American aeronautic industry was practically reorganized and recapitalized. Mergers and consolidations were almost every day occurrences, with the result that few, if any, are today familiar with the arrangement of the leading groups. With the idea of endeavoring to picture the industry's merger and consolidation position, AVIATION herewith presents the industrial and financial line-up of the "Big Four" and other leading operating and manufacturing groups.

The Aviation Corporation

Incorporated in Delaware. Capital stock authorized is 10,000,000 shares of no par common, of which 2,000,000 were sold in March, 1929, for $35,000,000 cash. On October 14, 1929 there were 3,068,817 shares of common stock outstanding. In addition to its controlled subsidiaries, which are shown hereafter, the corporation has a stock interest in the following companies: Aviation Corporation of the Americas, Bendix Aviation Corporation, Fokker Aircraft Corporation, Roosevelt Field, Inc., Waco Aircraft Company, Western Air Express Corporation. The Aviation Corporation, with its subsidiaries, controls approximately 27 per cent of the scheduled air lines in the United States and operates not quite half of the air mail routes.

Controlled Subsidiaries

ALASKAN AIRWAYS, INC (Taxi and miscellanous services)
COLONIAL AIRWAYS CORP (Holding company)
Colonial Air Transport, Inc (New York-Boston mail and passenger route)
Colonial Western Airways, Inc (Albany-Cleveland mail route and Buffalo-Toronto passenger route)
Canadian Colonial Airways, Inc (New York-Montreal mail and passenger route)
Colonial Flying Service, Inc (Taxi and miscellaneous services; flying schools and sales and service)
CUBAN AVIATION CORP (Holding company)
Servicio Cubano de Aviacion (Taxi and miscellaneous services)
EMBRY-RIDDLE AVIATION CORP (Holding company)
Embry-Riddle Company (Chicago-Cincinnati mail and passengrr rottte, taxi and miscellaneous services and flying school)
INTERSTATE AIRLINES, INC (Chicago-Atlanta and St. Louis-Evansville mail and passenger routes; taxi and miscellaneous services; flying schools and operation and ownership of airports)
SOUTHERN AIR TRANSPORT, INC. (Holding company)
Gulf Air Lines, Inc (Holding company) Gulf Coast Airways, Inc.—Atlanta-New Orleans-Houston mail routes)
Texas Air Transport, Inc (Dallas-Galveston and Dallas Brownsville mail routes)
S A T Flying Service, Inc (Dallas-El Paso; Dallas-Brownsville and Dallas-Houston passenger routes)
T A T Flying Schools, Inc (Flying schools)
Southern Aeromotive Service, Inc (Chain of service stations at sixteen points on S A T lines)
Dixie Motor Coach Corp (Bus lines chiefly in state of Texas)
UNIVERSAL AVIATION CORP (Holding Company)
Robertson Aircraft Corp (Chicago-St Louis mail and passenger route and St Louis-Kansas City Omaha mail route; sales and service, taxi and miscellaneous services and aerial surveys)
Continental Air Lines, Inc. (Cleveland Louisville mail route; sales and service, taxi and miscellaneous services)
Northern Air Lines, Inc (Cleveland Chicago-Kansas City-Garden City passenger route which links up with the New York Central, Atchison, Topeka and Sante Fe and Western Air Express to make the Transcontinental air rail route)
Bronniff Air Lines, Inc (Tulsa-Oklahoma City-Dallas passenger route; sales and service; taxi and miscellaneous services)
The Control Airlines Company (Kansas City-Wichita and Wichita Tulsa passengerr routes; sales and service, flying schools)
Robertson Flying Services Inc. (Flying school)
Mid Plane Sales and Transit Co (Flying school)
Egyptian Airways Co (Flying school)
Porterfield Flying School Corp (Flying school)
FAIRCHILD AVIATION CORP (Holding company)
Fairchild Airplane Mfg. Corp (Airplane manufacture and sales and service)
Kreider-Reisner Aircraft Co Inc (Airplane manufacture, sales and service)
Fairchild Aerial Camera Corp (Aerial camera manufacture)
Fairchild Aerial Surveys, Inc. (Aerial surveys)
Fairchild Aircraft, Ltd
Fairchild Engine Corp
AVIATION SHARES CORP (Holding and securities company)
The Aviation Patent and Research Corp
The New York Aviation Corp (Securities company)

Curtiss-Wright Corporation

Common stock 10,000,000 shares of common no par value and 2,000,000 shares Class A stock

CURTISS AEROPLANE & MOTOR CO. INC. (Operating and holding company. Manufacture airplanes and airplane engines. Airplane research laboratories)
Curtiss-Wright Flying Service, Inc (Operate a chain of flying schools and aerial activities throughout the United States)
Curtiss Aeroplane Export Corp. (To promote and distribute Curtiss-Wright products abroad)
Curtiss-Caproni Corp. (Manufacture products designed by Caproni of Italy)
Curtiss-Robertson Airplane Mfg. Co. (Manufacture Curtiss-Wright "Robin" airplane)
CURTISS AIRPORTS CORP (Chain of airports throughout the United States)
WRIGHT AERONAUTICAL CORP. (Manufacture complete line of Wright aircraft engines)
MOTH AIRCRAFT CORP. (Manufacture British DeHaviland "Moth" light airplane)
KEYSTONE AIRCRAFT CORP. (A combination of Keystone Aircraft Co., builder of transports and bombers, and the Loening Aeronautical Engineering Corp., makers of amphibians. The company also has rights to manufacture the Short flying boat)
NEW YORK AIR TERMINALS, INC (Terminals at Secaucus N. J., Hadley Field N. J. and North Beach, L. I. etc.)
NEW YORK & SUBURBAN AIR LINES, INC. (Charter trips)
TRAVEL AIR CO. (Manufacture Travel Air airplanes)

Affiliated Companies

CURTISS REID AIRCRAFT CO (Manufacturers in Canada of metal Reid "Rambler" airplane)
CURTISS ASSETS CORP (Holding company for stock in various Curtiss companies)
AVIATION EXPLORATION, INC. (Development air routes in China)
AVIATION CREDIT CORPORATION (To finance dealers and buyers of Curtiss products)
AVIATION CORP OF CALIFORNIA (Holding company for various aeronautical securities)
COMPANIA NATIONAL CUBANA DE AVIACION CURTISS (Operation airways, instruction and general air service)
NORTH AMERICAN AVIATION (Holding company capitalized at $25,000,000)
Pitcairn Aviation Corp (Miami-New York mail route)
Sperry Gyroscope Co (Manufacture instruments searchlights, etc.)
Diversified interests in various other aeronautic enterprises
NATIONAL AVIATION CORP. (Holding and investment company. Joint owner of Pitcairn Aviation Corp.)
Diversified interests in various other aeronautic enterprises
TRANSCONTINENTAL AIR TRANSPORT (Air-rail transcontinental route in conjunction with Pennsylvania and Santa Fe Railroads)
NATIONAL AIR TRANSPORT (Dallas-Chicago and Chicago New York mail and passenger routes)
Maddux Air Lines (Los Angeles-San Francisco, Los Angeles Phoenix, and Southern California passenger routes)

IN THE INDUSTRY

By ERNEST JONES
Prepared in co-operation with Aviation Business Bureau, Inc.

United Aircraft and Transport Corp.

Capital stock $50,000,000

PRATT & WHITNEY AIRCRAFT CORP (100 per cent owned. Formerly subsidiary of Niles-Bement Pond. Manufacture air cooled engines)
BOEING AIRPLANE CO. (100 per cent owned. Manufacture military and civil airplanes of many types)
BOEING AIR TRANSPORT (100 per cent owned. San Francisco-Chicago mail and passenger route)
PACIFIC AIR TRANSPORT. (Los Angeles-Seattle mail and passenger route)
CHANCE VOUGHT CORP (100 per cent owned. Manufacture military and commercial airplanes)
THE HAMILTON STANDARD PROPELLER CORP (Manufacture propellers)
HAMILTON METALPLANE CO. (Manufacture metal airplanes, now operating as a unit of Boeing Airplane Co.)
STEARMAN AIRCRAFT CO. (Manufacture airplanes)
SIKORSKY AVIATION CORP (Manufacture amphibians)
STOUT AIR SERVICES (Detroit-Cleveland and Detroit - Chicago passenger routes)
NORTHROP AVIATION CORP. Manufacture airplanes (not yet in production)
UNITED AIRCRAFT EXPORTS, INC (To promote and distribute United Aircraft & Transport products abroad)

Detroit Aircraft Corporation

Originally organized as Aircraft Development Corp to develop all-metal airship. Capitalized with 2,000,000 shares of no par value. Outstanding 888,078 shares.

AIRCRAFT DEVELOPMENT CORP (100 per cent owned. Manufacture metal airships and mooring masts)
RYAN AIRCRAFT CORP. (100 per cent owned. Manufacture Ryan planes)
AIRCRAFT PARTS CO. (100 per cent owned. Manufacture automatic riveting machines for metal airships, flying boat hulls, etc.)
GROSSE ILE AIRPORT, INC. (100 per cent owned. Owner and operator airport with airship hangar)
MARINE AIRCRAFT CORP. (100 per cent owned. Manufacture amphibians)
BLACKBURN AIRCRAFT CORP. (Holder patent rights Blackburn Airplane and Motor Co. Ltd. of England)
EASTMAN AIRCRAFT CORP. (100 per cent owned. Manufacture flying boats)
LOCKHEED AIRCRAFT CORP. (Manufacture the Lockheed "Vega" air-express and Sirrius planes)
PARKS AIR COLLEGE, INC. (Manufacture training plane and operate flying school)
GLIDERS, INC. (100 per cent owned. Manufacture Gliders)
DETROIT AIRCRAFT EXPORT CORP. (100 per cent owned. Handles all exporting)

Bendix Aviation Corporation

Capitalized with 3,000,000 shares, of which 2,200,000 are outstanding. Of this stock, 500,000 shares were bought by General Motors Corp for $15,000,000.

DELCO AVIATION CORP. (Ignition System)
STROMBERG CARBURETOR CO OF AMERICA
SCINTILLA MAGNETO CORP.
ELECTRIC AUTO LITE CO.
ECLIPSE MACHINE CO. [ECLIPSE AVIATION CORP.] (Starters)
BENDIX COWORY BRAKE TESTER CORP.
STINSON BRAKE CONTROL MECHANISMS (Manufacturer by Stinson Aircraft Corp.)
PIONEER INSTRUMENT CORP
GENERAL INSTRUMENTS CORP
James P Marsh Co. (Gauges and heat control appliances)
American Paulin System, Inc. (Instruments)
Tiffney Mfg Co (Gauges)
BENDIX REAL ESTATE CO. (Real estate holding company)
AMERICAN PROPELLER CO (Heath propellers and adjustable and reversing mechanisms)

Aviation Corporation of the Americas

PAN AMERICAN AIRWAYS, INC.
Mexican Aviation Corp
NEW YORK AIRWAYS, INC
PERUVIAN AIRWAYS, INC (50 per cent outstanding shares)
PAN AMERICAN GRACE AIRWAYS. (50 per cent)

Sky Specialties Corp.

200,000 shares authorized; 125,303 outstanding

HEYWOOD STARTER CORP
SIMON AIRPLANE APPLIANCE CO.

Federal Aviation Corporation

2,000,000 shares authorized; 400,000 outstanding

WASHINGTON-NEW YORK AIR LINES
Metropolitan Air Terminals
Washington Airport
Washington Air Terminals
RUSSELL PARACHUTE CO.

Air Investors

Convertible preference stock 250,000 shares authorized, 90,000 outstanding; common stock 1,500,000 shares authorized, 160,000 outstanding

COMET ENGINE CO.
THE AIRCRAFT ENGINE CORP
UNITED AVIATION CORP
SCENIC AIRWAYS
WYOMING AIRWAYS

Alexander Industries

Capital stock 600,000 pfd 8 per cent cum. at $100 par; 60,000 pfd. 7 per cent cum. at $1 par; 500,000 common of which 300,000 outstanding

ALEXANDER FILM CO.
ALEXANDER AIRCRAFT CO.
PYRAMID FILM CO.

Allied Aviation Industries

500,000 shares authorized, 125,000 outstanding

LAMBERT AIRCRAFT ENGINE CO.
MONO AIRCRAFT CO.
AVIATION ACCESSORIES CORP.
HURRICANE AIRCRAFT ENGINE CO.

Allied Motor Industries

50,000 shares pfd., 24,500 outstanding; 500,000 shares common, 180,900 outstanding

HENNEY MOTOR CO.
VAN SICKLEN CORP
WEATHERPROOF BODY CORP
GREAT LAKES AIRCRAFT CORP.
AMERICAN CIRRUS ENGINE CO
AM AERONAUTICAL CORP. (Savoia seaplanes)

Atlantic Seaboard Airways

150,000 shares; 122,735 outstanding.

INTERNATIONAL AIRWAYS, INC.
Potomac Flying Service
Hoover Field
Haines Point Flying Service
GETTYSBURG FLYING SERVICE

American Eagle Aircraft Corp.

2,000,000 shares; 200,000 outstanding

LINCOLN AIRCRAFT CO.
PORTERFIELD AVIATION INTERESTS
WALLACE AIRCRAFT, INC.
CRESCENT PROPELLER CO.

Arrow Aircraft and Motors Corp.

100,000 shares, 87,500 outstanding

PATRIOT MFG. CO.

Chicago Air Service, Inc.

100,000 shares, 37,500 outstanding

GRAY GOOSE AIR LINES, INC.
NORTH SHORE AIRPORT CO.
SKY HARBOR

Consolidated Aircraft Corp.

FLEET AIRCRAFT CORP
THOMAS-MORSE CO
NATIONAL FLYING SCHOOLS, INC.
KINNER AIRPLANE & MOTOR CORP (substantial block of stock in this)
FRONTIER ENTERPRISES, INC.
NIAGARA-FROM-THE-AIR, INC.

Kenneth M. Lane

REGULATING Air Commerce

ARTICLE II— ENGINEERING

By KENNETH M. LANE
Chief, Engineering Section, Aeronautics Branch, Department of Commerce

For the airplane manufacturer who, in his own opinion, has not received the action desired once his stress analysis has been forwarded to the Aeronautics Branch, the accompanying article should be of more than a little interest. It is the second of a series of six articles on the licensing and inspection work of the Aeronautics Branch, and contains authoritative information regarding proper procedure and obstacles encountered in the matter of obtaining that very much desired Approved Type Certificate. The third article of the series, appearing in next week's issue, is by Jesse W. Lankford, chief, Registration Section, and deals with the licensing of airmen and aircraft.

THE PRIMARY FUNCTION of the Engineering Section is to insure the proper structural design of aircraft that are to be made eligible for license.

To accomplish this purpose it was first of all necessary to establish certain definite minimum requirements which must be met before an airplane could be certified as airworthy. The original requirements, issued in October, 1927, as the "Handbook for Airplane Designers," were based largely on Army and Navy practices modified to adapt them to commercial needs. As a result of the experience of the Aeronautics Branch and with the cooperation of the Army, Navy, National Advisory Committee for Aeronautics and Bureau of Standards, these requirements have been revised and simplified. The latest revision, recently issued as "Airworthiness Requirements" covers airplanes, engines and propellers.

A separate category has been established for light planes—those having a power loading of more than 30 lb per hp—and gliders. There has also been established a set of requirements for the aproval or certification of airplane performance data. The introductory paragraph of this section reads as follows—"On the premise that it will be highly desirable for the airplane manufacturer to know and to be able to advertise bonafide performance characteristics of his product the Department of Commerce will approve such data when the requirements specified below have been complied with." It is interesting to note that so far no manufacturer has had the temerity to avail himself of this service.

As more exact data becomes available and as the experience of the Department is widened further modification and amplification of requirements will be necessary. Fortunately for the industry, more exact data will permit an easing off which it is believed, will more than offset the increase in rigidity of certain requirements which is necessitated by unsatisfactory experience. Basic data on strength of materials, possible loads on component parts of aircraft, form factors for various types of construction, etc., are obtained from the Army, Navy National Advisory Committee for Aeronautics, Bureau of Standards, universities and technical schools, and to an appreciable extent from the airplane manufacturers themselves. Reports of accidents involving material failure furnish the major portion of the experience upon which modification of the requirement is based. These are augmented by miscellaneous reports from inspectors and operators, and personal experience of the Engineering Section personnel. The Department is also indebted to the aircraft regulatory services of other governments, particularly the Canadian, for data based upon their experience with commercial aviation. The study and correlation of all these data constitute an appreciable portion of the activities of the section.

HAVING established the requirements for airworthiness, it is the task of the Engineering Section to examine the data submitted by the airplane manufacturer to determine whether or not these requirements have been met. The data to be submitted consists of a complete set of drawings, stress analyses of wings, fuselage, landing gear, control surfaces, control system and all fittings connecting parts of the primary structure, and the general specifications for the airplane, including a list of standard equipment furnished with the airplane.

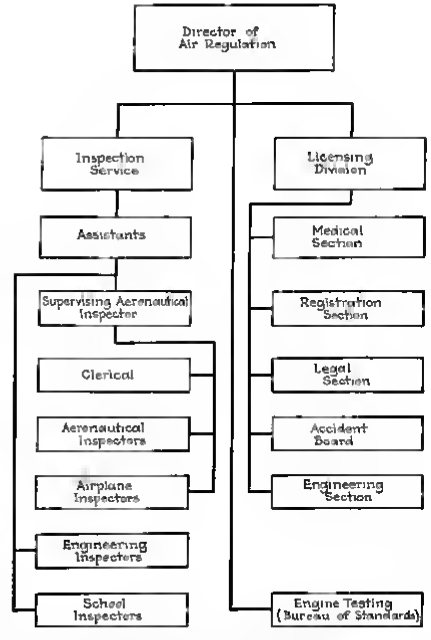
The drawings are examined for conformity with the requirements and with good engineering and shop practice. An attempt is made at this time to discover any details or features which may develop weakness or cause trouble in service. Most of these are not capable of an exact analysis but are designed largely by judgment. As may readily be appreciated, this is not an easy task when working solely with drawings, and it is not always possible to detect these faults. Fortunately this investigation is supplemented by a visual examination of the actual airplane by the engineering inspector.

The drawings are then checked against the stress analysis in order to determine whether or not the structure analysed is identical with that which will presumably be built from the drawings. Strange as it may seem, it is no unusual occurrence to find that size and material called for in the analysis differ from those shown on the drawing.

The stress analysis is then checked for completeness, for errors of assumption, for deviation from approved methods and for mathematical errors. This checking constitutes the major part of the work of the section and at the present time requires the services of nine engineers. The time required for checking a complete new design will vary from one to three weeks. The longer time required is not always due to the greater size and complication of design of the airplane, but is often attributable to lack of clarity of the analysis. The stock reply to the question "What can I do to expedite approval of my design?" is "Have your data correct, complete and presented in such form that it is easy to follow." Occasionally there will be found an analysis which would require for its investigation, the combined efforts of a seventh son of a seventh son and a crossword puzzle expert equipped with a ouija board. It is obvious that each designer will have his own general method of attacking the various problems involved in a stress analysis and his own characteristic type of detail design. For this reason, insofar as is possible, all data emanating from a given company or designer is assigned to the same checker. His familiarity with the method enables him to check the analysis more expeditiously than a man who has been accustomed to a slightly different procedure.

ANOTHER SOURCE of delay—in that it involves an interchange of correspondence and the preparation and submission of additional data—is lack of completeness. Incidentally, this applies to drawings as well as to stress analyses. In the case of the latter, it may be failure to investigate the structure for one or more of the required conditions of loading, failure to investigate the strength of certain members or details—this is particularly true of fittings—or failure to investigate eccentrically loaded or curved members for the effect of combined bending and direct stress.

There has been a gradual decrease in the number of cases involving errors of assumption. There is still room for improvement, however, and it is hoped that in the course of time all engineering departments will become familiar with approved methods. This will not entirely eliminate trouble from this source. Analyses are still being submitted in which there is displayed a surprising



Organization Chart of the regulatory activities of the Aeronautics Branch. These activities, together with Airways and Aeronautic Development are under direct supervision of the Assistant Secretary of Commerce for Aeronautics.

lack of knowledge of the fundamental principles of applied mechanics and the theory of structures. Many stress analysts seem to be willing to make practically any assumption rather than employ the theorem of least work in the investigation of a redundant structure. It is quite common to yield to the temptation to resort to a somewhat optimistic assumption in order to avoid the necessity for strengthening a member when an increase in allowable gross weight is desired. One analysis, following a computation which showed that, with a coefficient of 1.0, a certain strut was under strength, stated quite frankly that inasmuch as a coefficient of 1.0 was insufficient, a coefficient of 1.7 would be assumed. As might be suspected, with the latter assumption, the strut would show a slight margin of safety.

ERRORS IN METHOD are principally due to failure to follow correctly the procedure outlined in the requirements. Although it is difficult for the personnel of the Section to conceive of such a possibility, it may be that this is partly due to lack of clarity in the wording of the requirements. If such be the case, trouble from this source should gradually be eliminated. Where repeated confusion is found in connection with a certain section of the requirements, supplementary notes will be issued covering the subject more clearly and in greater detail.

Although some improvement has been noted of late, mathematical errors still contribute largely to the delay in obtaining an Approved Type Certificate. This is apparently due to the fact that only a few organizations have the calculations checked before submission to the Engineering Section. Such checking is, of course, not compulsory, but the manufacturer must run the risk of the loss of time occasioned by an interchange of correspondence and preparation of corrections. When the error is of such a nature that it is apparent that the strength of the structure is sufficient or that the effect of the error upon the final result may readily be determined, no correction is required. The designer, however, is advised of the error in order that he may bear it in mind when, at a later date—e.g., when the first airplane of the type is actually weighed—he applies for approval of an increased gross weight. If the error is such as to require changes in design or where there are a succession of errors so that it would be necessary for the checker to rework the analysis, revised computations are required.

When the engineering data have been finally approved, a memorandum to this effect is sent to the Inspection Service requesting that an engineering inspection and flight test be conducted. In this memorandum are noted the maximum allowable gross weight, directions as to witnessing such static and dynamic tests as may be required and remarks concerning any features of the design which should be given special attention by the inspector.

WHEN the report of the engineering inspection is received it is checked and if it is found to be satisfactory, the airplane is approved as airworthy and eligible for license. If, in addition, suitable manufacturing facilities are provided and factory methods are found satisfactory, an Approved Type Certificate may be issued. If it is not the intention of the manufacturer to produce the design in any great quantity, the plane is placed on the Group 2 list, i.e., planes eligible for license but not having an Approved Type Certificate.

In either case an engineering memorandum is written, copies being sent to Inspection and Registration Sections. This memorandum contains a brief specification, including weight data, and remarks as to the serial numbers of planes eligible, placards to be displayed, approved alternative equipment, etc. These serve as a guide to the eligibility of the various planes for which applications for license are submitted to these two sections.

The foregoing covers the processes involved in the issuing of an Approved Type Certificate for an airplane. The procedure is similar for the approval of a propeller except that a whirl test is substituted for the performance tests of the aircraft, and no stress analysis is required except in the case of unconventional design.

Approval of engines is based upon actual endurance and flight tests and requires no stress analyses. The endurance tests, except in the case of engines which have already been approved by either the Army or the Navy, are conducted by the Bureau of Standards. As a result only a slight amount of work on the part of the Engineering Section is entailed in the granting of an Approved Type Certificate for an engine.

At present, the only other parts or units, approved as such are seaplane floats. These are checked for strength, including strength of attachment fittings and for buoyancy. They are then approved for use on any airplane, the gross weight of which does not exceed that for which sufficient reserve buoyancy is provided. It is planned to provide for similar approval of other standard parts as rapidly as test data and additional personnel become available. For the present, however, in the absence of such a blanket approval, each installation of such a unit is investigated for its specific application to the aircraft in question.

THERE HAS BEEN a steady increase in the volume of work required in connection with remodeling and repair of aircraft damaged in crashes. This consists of checking computations and examining drawings covering the proposed repairs. If they are found satisfactory, the drawings are stamped with the seal of the Department of Commerce and turned over to an inspector. The latter examines the repaired plane for conformity with drawings and for quality of material and workmanship.

In addition to the foregoing, there is a steady flow of general correspondence covering a wide range of subjects. Some of these, such as a request from an insurance company for information regarding the status of a particular model, may be answered by clerical personnel. Others, such as a request for endorsement of the method of analysis or the allowable unit stresses involved in a new or unique type of design, will require considerable study and care in preparation of the reply by the Engineering personnel. It may be of interest to note that there has been of late a considerable volume of work of this sort. If all these projects are carried out, we shall see some very interesting solutions of the problem of metal construction.

Although such a reference has nothing to do with a description of the activities of the Engineering Section, it is felt that this article would be incomplete if it failed to pay tribute to the spirit of cooperation exhibited by the aircraft manufacturers and designers. Differences of opinion are bound to arise, but as long as the present attitude of the manufacturer is maintained, there should be no difficulty in reaching an amicable agreement. For its part, the Engineering Section, honestly endeavors to avoid the injection of personal preference or prejudice into its investigation of the design.

SURVEYING THE Airport Problem IN NEW YORK CITY

By JOHN C. HOLME, JR.

The Second of a Series of Three Articles on the Important Question Typical of Most Congested Areas

THIRTY AIRPORTS have been constructed in and about New York. Unfortunately, their backers have paid small heed to the necessity for their co-ordination and the provision of adequate facilities for transportation to central Manhattan, the considerations regarded as most important in the two reports which were the subject of the previous article. These important points, however, have been given due weight in the selection of sites for others which are now being developed, or for which definite plans have been made. In addition, several of the more favorably situated fields now in use are being improved to provide adequate facilities for passenger transport service.

In view of the importance of this matter of accessibility, especially in a large Metropolitan area like New York, and because of the tendency of many airport operators to quote minimum schedules to their fields, a survey of the actual times required by various means of available transportation was made by the author. The results of this study indicate the seriousness of the problem of making airports as effective as the public has every right to expect.

The oldest field in the district is at Mineola, near Garden City, L. I. One of the first successful flights made by Glenn Curtiss took place there as long ago as 1909. During the War, it was developed by the army, and it remains a strictly military airport. It is now known as Mitchel Field.

Roosevelt Field, also located at Mineola, was transformed into a commercial airport after the War. The old Curtiss Field has been incorporated with it, and it now comprises 495 acres, making it the largest as well as the best equipped airport in the New York district. It is famous as the take-off site for many flights, including those of Lindbergh, Byrd, Chamberlin, and Hawks. They are not easily accessible. Located at a distance of 20½ miles by road, it is an hour and 15 minute drive from central Manhattan, via the Queensboro Bridge, Corona Avenue, Nassau Boulevard, following the arrows "Mineola, Fly, Roosevelt Field" which have been put up by Roosevelt Field, Inc. Trains on the Long Island Railroad make the trip to Mineola from the Pennsylvania Station in 40 minutes, leaving approximately every half hour. An additional 20 minutes is required to reach the field.

Roosevelt Field now has complete lighting equipment, a weather bureau, Department of Commerce station, and radio installation. A score of hangars provide complete service, sales and training. During the winter months there is dense fog an average of three days per month; during the spring and autumn, two days per month; and during summer, one day per month. Local fog averages nine days per month throughout the year. Dense fogs may occur any time of day and frequently last throughout the entire day.

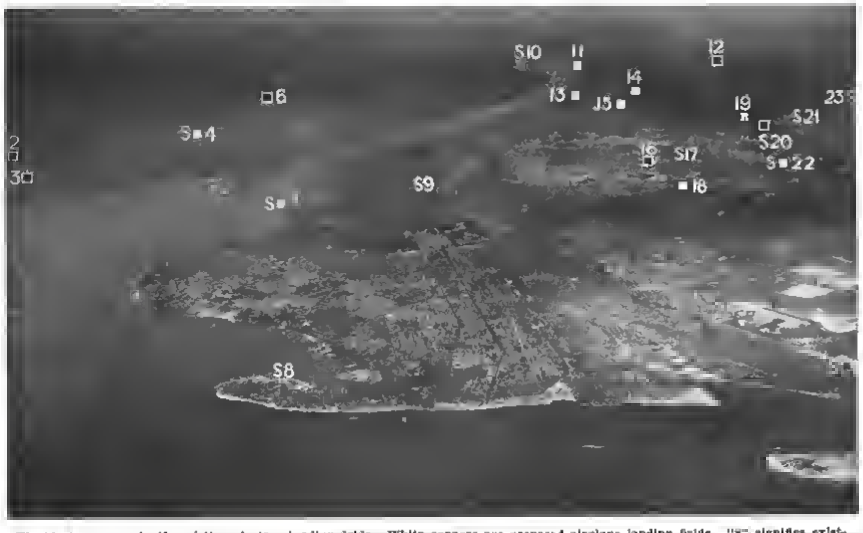
VIRTUALLY every line of aeronautical endeavor is represented at Roosevelt Field. Air Associates offers several types of planes for sale, plane and motor service, storage, taxi and joy-hops, and cross-county trips; the Curtiss Airplane and Motor Company is immediately adjacent; dealers for practically every type plane have hangars on the port; the Fairchild Aerial Surveys headquarters is also at the field as is the American agency for Siemens-Halske motors. Several owners and operators of private planes have individual hangars on the field, among them Roger Wolfe Kahn. Chief in activity are the schools, the largest of which is Roosevelt Aviation School Inc.; the parent company of which operates the field and a complete aerial taxi, joy-hop, and cross-county service under the title of Roosevelt Flying Corporation. Several aerial advertising units principally Skywriting Inc., Aerial Advertising Company, and Plane-Speaker Inc., also maintain headquarters on Roosevelt Field. One of

the nation's largest distributors of aircraft, George Weis, maintains two hangars and demonstrators of a half-dozen varieties of planes on this port.

HADLEY FIELD, 50 miles by road from central Manhattan, is another field which was established early. Consisting of 80 acres, it has been well known as the eastern terminus of the air mail. It is two hours and fifteen minutes from New York by automobile via the Holland Tunnel, Jersey City, Newark, Elizabeth Railway, Metuchen, and the Lincoln Highway. Trains from the Pennsylvania Station, leaving every 50 minutes on the average, make the run to New Brunswick N. J. in one hour. The traveling time to the field on this route is one hour and 25 minutes including a four-mile taxi ride to the the field from the New Brunswick station. Hadley Field is now controlled by New York Air Terminals, Inc., and on this site are located National Air Transport, Colonial Air Transport, Pitcairn Aviation, Bell Telephone Laboratory, Unger-Travel-Air Distributor, a Weather Bureau station, and radio range station. There are three hangars on the field and complete lighting equipment for night flying. Pilots have experienced dense fogs at the field two days per month during winter and spring, and one day per month in summer and autumn, during the past year. Fogs usually last from about 4 a.m. to 10 a.m.

The Newark metropolitan airport at Port Newark N. J., has been developed as a result of the proposal of the Fact-Finding Committee Report. It is the most accessible airport now in use near Manhattan. By automobile it is 45 minutes from Times Square, via Canal Street, Holland Tunnel, and extension of the Lincoln Highway. It is 25 minutes from Canal Street and Broadway and 30 minutes from the downtown section. Accommodations for passengers on the Colonial Boston-New York trip are made by a company bus from Hotel Pennsylvania to the field. It is a 50 minute trip from Times Square via Hudson tubes. The Lincoln Highway is to be improved, which will reduce the driving time from the field to Canal Street and Broadway to a 20 minute trip. Located at the field are: Eastern Aeronautical Corporation, distributors for Ryan, Commandaire, Stearman, Curtiss Wright Flying Service and Wright Motor Service, Newark Air Service, distributors for Travel Air and operators of a Flying School, Colonial Air Transport, whose passenger and mail planes fly to and from Boston on a twice daily schedule; United States Airlines, Baltimore Airways, Inc., Weather Bureau station; hangar of Standard Oil Company of New Jersey and Interstate Flights Inc. There are two hangars under construction for Colonial and the National Guard in addition to the four occupied by Eastern Aeronautical, Newark Air Service, Colonial and Standard Oil Company. There are obstruction and beacon lights. Transport operations were suspended six days in April, five days in May, two days in June, two days in July, three days in August, and seven days in September, 1929, due to fog, smoke or stormy conditions. Pilots report that fog is greater in the early spring than late fall and still less in winter.

ANOTHER one of the older airports in New Jersey is at Hasbrouck Heights in the Hackensack Meadows area. It is owned by Teterboro Airport, Inc., and located 10 miles by road from uptown Manhattan. It is reached in 45 minutes driving via the 42nd Street ferry and Hudson Boulevard through Little Ferry and Hasbrouck Heights or approximately one hour from Times Square. It can be reached in 55 minutes of traveling by 42nd Street trolley, ferry, and two bus routes, or in one hour on the Jersey Central; or 45 minutes from Times Square via the Patterson bus line. The run from Liberty Street ferry by train to Hasbrouck Heights station, adjacent to the field, is 45 minutes, with trains running every hour and a half. The eastern factory of the Fokker Aircraft Company is located on the field. There are also a Wright Aeronautical Corporation hangar and the Teterboro Flying Service and the New Standard Flying Service at the Field. Two hundred and seven acres of the field have been developed and there are three hangars. There is dense fog an average of three days per month in winter, two days per month in the spring and fall, and one day per month in summer, with light fogs nine days per month throughout the year.



The black squares signify existing airplane landing fields. White squares are proposed airplane landing fields. "S" signifies existing and proposed seaplane landings. 1 Floyd Bennett Airport, 2 Newark, 3 Droyers Point, 4 Secaucus, 5 Atlantic Coast, 6 Teterboro, 7 Governors Island, 8 Coastal Sea Gate, 9 Lorning, 10 Croton Point, 11 Tarrytown, 12 Armonk, 13 Yonkers, 14 Scarsdale, 15 White Plains, 16 Holmes, 17 North Brush, 18 Juniper Valley, 19 Curtiss Hutchison River, 20 Old Ferry Point, 21 Glen Island, 22 N. Y. City Airport, 23 Rye, 24 Coastal-Mill Basin

Roosevelt Field, Garden City, L. I., the oldest airport in the district, combines the two fields formerly known as Roosevelt (1), and Curtiss (2). Field 3 is Mitchell Field and is an army airport.

Curtiss-Wright Flying Service, originally at Curtiss Field, Mineola, has its main field at Valley Stream, L. I., eighteen miles by road from central Manhattan. It is a one-hour drive from Times Square via the 59th Street Bridge, Queens Boulevard, and southeast to the field, or 50 minutes from downtown Manhattan, via the Manhattan Bridge, Flatbush, Atlantic and Pitkin Avenues, and Sunrise Highway to the field. Trains leaving every half hour from Pennsylvania Station on the Long Island Railroad arrive at Valley Stream in 32 minutes, making the actual traveling time to the field 50 minutes. There are modern hangars nearing completion and the field is used for student instruction and Curtiss-Wright taxi and chartered aerial transportation service. The field has a total of 400 acres.

The Queens-Flushing Bay area designated in the Fact-Finding Committee report has received much attention for proposed airports recently on account of its accessibility to uptown Manhattan. This area corresponds to area No. 2 of the Regional Plan and is at present the location for three major airport developments. Holmes Airport at Jackson Heights, three miles air line from Times Square and eight by road, is 35 minutes drive via the 59th Street bridge and Northern Boulevard. The Flushing I.R.T. trains run to within a 10-minute taxi ride of the field in 22 minutes, and bus routes from Fifth Avenue at 42nd St., and the Waldorf-Astoria bus terminal, make the trip to the field in an hour and 20 minutes. The field is at present uncompleted although 200 acres are being used by the Gates Flying Service for hops and taxi operations. It is expected that the airport will be completed next spring and other hangars in addition to the three present ones will be in use. With the completion of the officially adopted Tri-Borough Bridge and Boulevard, this airport will be readily accessible to uptown Manhattan and southern Bronx.

The New York Air Terminal seaplane base at North Beach, Queens, is the location of a proposed 200-acre airport development adjacent to the present seaplane base. This airport will be 35 minutes by road from central Manhattan via the 59th St. Bridge and Northern Boulevard or approximately 50 minutes from Times Square. The existing motor boat service from the 42nd Street East River terminal to the seaplane base adjacent to the proposed field will also be used for the airport. Via Flushing train from Times Square and 42nd Street and Broadway, and taxi, the time is approximately 42 minutes. This trip was made in 24 minutes from the 42nd Street dock or about 40 minutes from Times Square under average traffic conditions. It is possible that in the future most of the now existing permanent and fully equipped airports will be too far from the center of population to be used for air transportation but will be large enough and equipped fully enough to be very appropriately used for student flying, instruction, and other general commercial activities.

THE WESTCHESTER AIRPORT at Armonk, N. Y., operated by Westchester Airport Corp., is 35 miles by road from central Manhattan. It is a one hour and 10 minute drive via Bronx River parkway and through White Plains and route 22, or one hour and 30 minutes from Grand Central to White Plains on trains running every 25 minutes, the time from White Plains station to the airport by car being 55 minutes. Arrangements can be made by telephone for the company car to meet the train, reducing the time for the trip to one hour and 15 minutes. Barrett Airways, beside giving instruction is distributor for Fairchild and Stearman planes.

The field of Aviation Country Clubs, Inc., located near Hicksville, L. I., is unique in the respect that it is not intended to serve the metropolitan district passenger, or commercial operators. It is 30 miles by road from central Manhattan, a one hour and 20 minute trip by auto via the

59th St Bridge, Queensboro Boulevard, Corona Avenue, Nassau Boulevard and Motor Parkway or approximately one hour and 55 minutes from Times Square. Trains on the Long Island Railroad to Hicksville run every 50 minutes from Pennsylvania Station, the time to the field being 50 minutes. The 96-acre airport is the finest grass-sown field in this area. The club house offers every accommodation to visiting sportsmen pilots. It is private in membership, and is intended for Long Islanders interested in sport flying. The 40 plane hangar is at present inadequate to house all planes belonging to present members of the Aviation Country Club. The field is located far enough away from Roosevelt Field and other commercial flying operations so that the student flying solo is not apt to be unduly disturbed.

Another airport designed for similar purposes is Fitzmaurice Field at Massapequa, L. I. It is part of the real estate development of Brady, Cryan and Colleran, and is intended for private flying. It is 30 miles by road from Manhattan, or an hour and a half ride from Times Square via the Sunrise Highway to Massapequa Park or approximately. Trains leave from the Pennsylvania Station every hour, making the trip in 50 minutes to Massapequa station. A private concern operates a taxi and joy-hopping service on the 18-acre field.

THE FLOYD BENNETT municipal airport is located near Barren Island in Brooklyn. The field is twelve miles from Times Square and is reached by car in 65 minutes via the Manhattan Bridge and Flatbush Avenue, or 35 minutes from Borough Hall, Brooklyn. It is reached by the I.R.T. subway, Nostrand Avenue line and taxi in 68 minutes. Three hundred and eighty-five of the total 800 acres will be finished with completed runways by next spring. Contracts for fourteen hangars are being negotiated. The port will have a seaplane channel on Jamaica Bay. The field is unusually free from obstructions, and the existing overhead wires along Flatbush Avenue are to be put underground.

The Secaucus airport of New York Air Terminals, Inc., to be located in Hudson County, N. J., will offer a large, completely equipped airplane base with seaplane facilities within 30 min. of the business districts of Manhattan. Via the Holland Tunnel and Old County Road this location is 27 minutes from Times Square and company buses will accommodate passengers to the field. Eight hundred acres are being developed of the total 1,100-acre area, with 80 acres for seaplane facilities. This was a proposed site designated by both the Fact-Finding Committee and the Regional Plan Committee as the Hackensack Meadows area. Earliest operations on this port will be next summer. The area is adjacent to the Hackensack River and is cut by the Erie Railroad. The site has fewer days per year of dense fog than in the territory immediately south of it.

THERE ARE several existing flying fields in the New York District which at the present date have been undeveloped and are used by private companies for limited hops and taxi service. They include the Barren Island Airport adjacent to the Floyd Bennett Municipal Field, the Brooklyn Flying Service located at Ave. U and Garrison Ave., and the Jamaica Sea Airport at Springfield Boulevard and Jamaica Bay, Brooklyn. In addition to the above mentioned land airports, there are the following landing fields proposed or under construction, none of which are near enough to the metropolitan district to offer a solution to the problem of a large fully equipped airport accessible for metropolitan air transportation needs. White Plains, N. Y.; Hanover, N. J.; Summit, N. J.; Morristown, N. J.; White House, N. J.; Somerville, N. J.; Rahway, N. J.; Cranford Junction, N. J.; Elizabeth, N. J. Curtiss-Wright Flying Service proposes development of the Hutchinson River area designated as a desirable location by the Fact-Finding Committee and the Regional Planning Committee, and has an airport at Montclair, N. J., under construction. The site for the proposed Jersey City airport on Newark Bay at Dovers Point, N. J., has been proposed for land and seaplanes. It is 38 minutes from Times Square via the Holland Tunnel and Hudson Boulevard, and 50 minutes by Hudson Tubes from 34th Street by automobile.

The Floyd Bennett municipal airport near Barren Island, Brooklyn

Teterboro Airport at Hasbrouck Heights, N. J., one of the elder airports in the metropolitan area

Site 13 of the Fact-Finding Committee's recommendations for the Queens-Flushing Bay area is now an undeveloped field being used by the Pioneer Aerial Trades School. The three hundred and five acres are to be developed by next spring by New York City Airport, Inc., for a land and seaplane port. It is 5½ miles air-line from Times Square and 10 miles by road via 59th Street Bridge and Northern Boulevard. It is a 55-minute drive or 30 minutes on the Flushing I.R.T. subway plus an 8-minute taxi ride or approximately 70 minutes from Times Square. On the Pennsylvania Railroad it is 25 minutes to the Bridge Street station with trains every half hour. The station is two blocks from the airport. It is expected that a railroad station will be developed on this line adjacent to the property, making it 35 minutes from Pennsylvania Station or 40 minutes from Times Square.

There are, as mentioned above, three major airport developments in area No. 2 designated by the Regional Plan Committee for New York and Its Environs, which corresponds to the Queens-Flushing Bay area in the Fact-Finding Committee report. The Holmes and North Beach airports, 30 and 35 minutes respectively by auto from Times Square, furnish the best airports for central Manhattan in this area from the point of view of accessibility, a primary consideration from most viewpoints. North Beach at present is fully equipped with seaplane and amphibion air transportation service. New York City Airport, Inc., to be completed on site No. 13, off College Point, will be a third readily accessible port for both seaplanes and land planes, as it is only two blocks from the Bridge St. station of the Pennsylvania Railroad, a 25-minute run from Pennsylvania Station. In this area, it is interesting to note that site 61, the first choice of the Fact-Finding Committee, is again listed as an urgent proposal in the Regional Plan of New York in its proposed airport system.

It is the contention of Dwight Morrow, of the Regional Plan Committee [not the Ambassador to Mexico—Ed.], and also of the Topographical Bureau of the Board of Estimate and Apportionment of Queens, that this site, known at the Jumper Valley Marsh, could be filled by excavation from the approaches of the proposed Borden Ave.-38th Street vehicular tunnel, which has already been approved by the Board of Estimate and Apportionments. This tunnel, to be completed by 1935, will provide an express highway, from 38th Street and Third, Fourth or Fifth Avenues, Manhattan, with no intersections on the express highway, direct to Jumper Valley Marsh. An automobile will make the trip in 15 minutes. There are no seaplane accommodations available at this site, however.

The Tri-Borough bridge recently approved by city officials, will provide a rapid means of transportation from upper Manhattan and southern Bronx to airports adjacent to Flushing Bay and Northern Queens. In area 3 of the Regional Plan, Pelham Bay Park and vicinity, which corresponds to the Bronx East River area in the Fact-Finding Committee report, there is the Curtiss-Hutchinson River project.

THUS the question resolves itself into two issues. Will airports have to be located closer to the center of population in the metropolitan district, or will express highways be built, or developed directly to the fields? For instance, development of an express subway route on Long Island would make the larger airports which are now more fully developed and which have no physical obstructions, accessible to the metropolitan area, by virtue of being within the 30-minute range by transportation facilities from the metropolitan district. Due to the cost of either constructing new express highways or developing existing routes into express highways, it is held that the more practical solution for this whole problem is in the development of the Jumper Valley site, which would be 15 minutes from central Manhattan; the extension of the proposed 38th Street underground vehicular tunnel in Manhattan under the Hudson River to the Hackensack Meadows where the Secaucus airport is being developed; and the establishment of docks, pontoon cradles and rafts either on the Jersey shore, the Battery, or Ellis Island in lower New York Bay, for seaplane accommodations, the outlying ports being used as bases of service, repair and storage.

It is probable that both solutions will be used eventually, and it may be assumed that rapid transit facilities will be extended to the more outlying fields before those which are being constructed or planned within shorter range become overcrowded. However, it will be at least a year before present projects for providing the Metropolitan district with adequate airports inside the 30-minute radius from central Manhattan are completed.

AVIATION January 25, 1930

By L. W. MITCHELL, JR.
Vice-President Aviation Credit Corporation

OPERATION AND ANALYSIS OF THE Aviation Credit Corporation

A Detailed Outline of the Working Policies of this Organization Which has Been a Valuable Aid in the Sale of Aircraft in this Country

Financing of aircraft sales has, in the past, been most conspicuous by its absence. Little by little, however, serious attention has been paid to this all important item, with the result that today there are several workable and reasonable time payment plans available. In the development of those plans, Aviation Credit Corporation has played no small part. In the accompanying article Mr. Mitchell writes in detail of the company's policies and methods, and discusses the various problems relating to aircraft financing that still remain to be satisfactorily solved.

REALIZING that the day had arrived when the Time Payment Plan had become a necessary adjunct to the sale of aircraft, one of the more prominent groups in the industry formed Aviation Credit Corporation in the early months of 1929.

Characteristic of the policy of this aircraft group, a program of very searching investigation of problems was carried out before announcement of plans was made, and results to date seem to have justified the preliminary work done. During its first six months' operation, from April 1 to September 30, Aviation Credit assisted its factory and dealer connections by financing a very satisfactory percentage of total aircraft sales.

In order to secure the immediate services of trained credit and collection personnel, an arrangement was made through which the administration of Aviation Credit's program was assumed by Commercial Credit Companies, one of the large national finance companies. These companies have a record behind them of seventeen years of successful operation in automobile and similar financing, and maintain branch offices in approximately 200 cities in the United States and Canada, as well as offices throughout most of the world's civilized countries.

A very striking feature of this arrangement is the branch office network, by virtue of which airplane dealers may obtain local credit and purchase-of-paper service practically everywhere, and the necessary collection service is also nation-wide.

The retail financing plan of Aviation Credit, which is perhaps its most important function, is based on the following four theories:

1. The airplane dealer should receive the full list price of the plane he sells at the time of sale.
2. The seller of aircraft should assume sufficient liability on the paper to preclude the Finance Company being forced to merchandise used ships.
3. The system of requiring endorsers is not practical in volume business.
4. The collateral behind the paper, i.e., the airplane, should be protected by insurance against physical damage at least.

TO EXPAND on Theory No. 1, it would appear that the system of finance companies' withholding a portion of the proceeds due the dealer when he sells a plane on time works too much of a hardship on him. The business of merchandising aircraft is far from being on a standardized, consistently profitable basis, and it seems evident that dealers usually urgently need every penny due them when they make a sale immediately upon delivery of the plane. It is being said that the evil of over-capitalization has crept into the aircraft industry; very few dealers are troubled with this evil. Furthermore the "hold back" system was tried and found wanting in automobile financing some years ago, and there is certainly sufficient similarity in the two fields to justify the 100 per cent advance to dealers selling airplanes.

Theory No. 2, that of dealer recourse, is a widely discussed one. There are two extremes that may be reached in financing, of which the first is purchase of paper by finance companies without recourse on the dealer. This method appears to be fallacious because the finance company has no pilots, no hangars, nor service and resale facilities, and consequently is in a serious predicament in case it becomes necessary to repossess a plane. As a result, the finance company will be ultra-meticulous in the selection of the paper it purchases, and will be so timid that only the 100 per cent gilt-edged transactions will be accepted. A financing service of this nature will prove to be of little value as a sales assistance to factories and dealers.

The other extreme is for the finance company to require the dealer to guarantee out-and-out the payment of the purchaser's note; if an instalment becomes delinquent the finance company can call on the dealer to pay the balance due, and is under no obligation to afford the dealer collection service in an attempt to extract payment from the purchaser. This system of guaranteed paper so often leads to the very evil practise of the finance company, eager for volume of business, purchasing indifferent or poor paper merely on the strength of the dealer's endorsement.

There is a middle ground between these two extremes, and Aviation Credit has adopted this middle ground. That is the system of "Repurchase Agreement," which quite fairly divides the burden. The finance company furnishes the legal, credit and collection work, and the dealer takes care of the merchandising of airplanes, should any be repossessed.

Under the terms of the Repurchase Agreement, the finance company must locate, repossess and clear title to aircraft before the dealer has any obligation. Then, the dealer is only required to buy back merchandise, upon which he can realize, and usually profit.

The finance company has a very serious obligation to the dealer in purchasing paper on the Repurchase basis, and that obligation is to exercise its best credit judgment to protect the dealer from loss without being unduely strict on credit requirements. It would obviously be the poorest possible practise for a finance company to purchase a weak note just because the dealer stands behind it, ready to repurchase the plane if repossessed. It is the policy of Aviation Credit to reject paper that has all the appearances of loss to the dealer, but the fact that repossessions do not always result in losses (they have frequently proved quite profitable to the dealer), permits a certain liberality. It may be said in defence of the Repurchase Agreement that a repossession involves the finance company in more or less trouble and unpleasantness, and they are not likely to purchase much paper which will go bad, necessitating foreclosure, and thereby cause the dealer loss. All circumstances regarding each individual transaction must be very carefully considered.

Theory No. 3, concerning the requirement for the purchaser to secure endorsers on his note, may be briefly dealt with. This system has been found to be too complex and cumbersome in other financing fields where volume business is involved. There is only a limited supply of endorsers in the country, and their signatures can never take the place of other security, such as insurance. Endorsers, however, have and will continue to have a very definite place in many airplane transactions, any way to strengthen credits is welcomed by finance company and dealer alike. But it is becoming evident that the endorser system will not stand the test of volume business.

THEORY No. 4 is the insurance requirement, which is frequently (and erroneously considered to be a sales resistance. Aviation Credit feels that it is in keeping with sound financing practise that the collateral behind each note be protected against physical damage, and for that reason it is required that each plane financed be covered against the hazards of fire, theft, windstorm and crash. In order to assure uniform protection, afforded by known insurance companies, Aviation Credit places this coverage, and the purchaser of the plane receives the original policy. The Liability Coverages will also be placed if the purchaser so desires, as a matter of fact, more than 50 per cent of the purchasers that have bought through Aviation Credit have requested the Liability coverages and have taken advantage of the very reasonable rates that have been procured. It cannot be denied that insurance rates are somewhat high, but Aviation Credit has been fortunate in being able to secure quite reasonable rates for the required coverages.

Aside of the soundness of insurance protection for the article financed, there are two other points to be considered: (1), the great majority of responsible purchasers would buy insurance themselves to protect their

investment, (2), Aviation Credit assists the purchaser to buy this insurance by including two-thirds of the premium cost in the note, thereby affording deferred payments on the insurance policy as well as on the plane itself.

Terms of Aviation Credit's retail financing plan are simple and more or less standard. The purchaser is required to make a down payment of at least one-third of the cost of the plane to him, plus one-third of the insurance premium, at the time he takes delivery. He signs one note, which is divided into equal monthly instalments, 12 months is the longest note permitted.

IT MAY not be amiss to mention the legal problems that have confronted Finance Companies entering the Aviation field. These problems have been many and varied, and further complicated by a rather general ignorance of aircraft law, where such law exists, and lack of precedent. Aviation Credit feels that most of its legal troubles are over, and has been for some months doing business in all states in the country except one. It is most unfortunate that the statutes of Pennsylvania are so drawn that finance companies as a rule do not feel sufficiently safe to finance airplanes for retail purchasers resident in that State.

The Department of Commerce has been eminently sympathetic and helpful to finance companies, and a great debt of thanks is due these hard-working gentlemen in Washington for the assistance they have given.

Before leaving the subject of law, mention should be made of the hardship worked on finance companies by certain provisions of the Uniform State Aircraft Law. This law was formulated before aircraft financing had reached proportions worthy of consideration, and it provides that the *legal owner* of an airplane is directly responsible for damage done to persons or property by that airplane. This provision forces finance companies to employ chattel mortgages as security instruments, they would much prefer to use conditional sale contracts, which are by far the less cumbersome and complicated form of instrument. But there is just enough doubt as to how courts will construe the position of conditional vendors to cause hesitancy in the use of conditional sale contracts, in spite of the very obvious fact that a finance company has no control over the operation of the planes it is financing, and cannot fairly be held liable for damage they may cause [illegible] therefore Chattel Mortgages. This is the reason why Pennsylvania is excluded from retail operations, and conditional vendors might possibly be held liable for damages under present Pennsylvania laws, as Chattel Mortgages are not recognized by the statue books.

So much for retail financing. Aviation Credit has a wholesale, or floor plan, which seems to be growing in popularity with dealers desiring to purchase new planes from factories for storage or display purposes.

Dealers may obtain new planes from manufacturers or distributors by making a cash payment of 10 per cent or 15 per cent of invoice cost, and defraying transportation expenses and finance charges. Acceptances covering balances due may be executed for one, two or three months. These acceptances may be renewed or extended at maturity if desired, upon payment of a curtailment and further charges.

Finance charges on wholesale are extremely reasonable, and furthermore are rebated on a pro-rata basis in case of anticipation. If a dealer sells a plane covered by a 60 day acceptance in 30 days, he will be rebated one-half of the charge. (It goes without saying that when planes are sold, acceptances covering them must be immediately paid in full.)

Planes covered by wholesale acceptances may not be flown or otherwise demonstrated, as they are only covered by insurance against the perils of fire, theft and windstorm. Aviation Credit places this insurance for the full amount of dealer's cost, at a very reasonably monthly premium.

Insurance is placed for the full amount of dealer's cost, and not for the finance company's investment, or vendor's interest, only. It is felt that very few dealers desire to have their 10 per cent or 15 per cent interest in floor-planned planes go unprotected. If the finance company places full cover, it relieves the dealer of the necessity of buying his own insurance on his equity in the planes.

Many dealers seem to feel that they should be allowed to demonstrate floor-planned planes, but as has been stated above, Aviation Credit is of the firm opinion that collateral behind paper should be adequately protected against all risks. Since no crash rate equitable to all dealers has yet been worked out for wholesale, no flying must be the rule. It would seem obvious that the only fair premium basis for wholesale crash insurance is an "hours flown" basis; it isn't fair to charge a dealer flying his plane 5 hours a month, the same premium as one flying his 30 hours. Until a reasonable plan covering this is evolved, dealers are recommended to purchase planes on the retail plan if they must fly them. If payments on retail transactions are anticipated (in case the plane is sold to a retail purchaser), reasonable rebates are made on finance charge and insurance premium.

IN CONNECTION with wholesale, AVIATION Credit has a Flyaway Plan, through which a dealer may take delivery of new planes at the factory and fly them to his place of business. The planes must then be placed in hangar or showroom, and may not be flown again until the acceptances covering them are paid. Planes are covered by insurance for fire, theft, windstorm, crash, public liability and property damage for the duration of the flight from factory, at a fair premium rate.

Another phase of the industry in which Aviation Credit has become active is in the financing of flight training courses. Everyone realizes that there is going to be an acute shortage of pilots, and therefore a system has been worked out (and is in actual operation) to provide flight instruction on a deferred payment plan.

Flying School Notes, so-called, are signed by students and one or more property-owning co-signers. Down payments ranging from 25 to 33⅓ per cent of the cost of the course are paid to the school at the time of commencing the course, and the balance is paid to the school at once by the finance company. Monthly payments on the note may be started immediately or at the completion of the course. Charges on flying school notes are low.

There are many other angles of the industry in which the finance companies will probably play an important part as time goes on, such as financing shipments of engines and other material to plane manufacturers, erection of hangars, beacons, flood lights, etc. It will be just as well for manufacturers, dealers and operators to work closely with finance companies, and avail themselves of the facilities offered wherever possible. Finance companies have contributed so largely to the success of other industries that they cannot well be ignored by aviation.

GENERAL NEWS

HERBERT F. POWELL, *News Editor*

HIGH POINTS in the NEWS

▶ *Brilliant meet closes.* All American races run at Miami. Outstanding performers: Williams, Jackson, Davis, Little, Nash, Keightley, Bridges, and Stathan.

▶ *A $98,000,000 year.* So says Aero Chamber of 1929 in report on planes, engines, and parts production. Totals: planes, 6,034; engines, 7,378. Advance over last year. About $36,000,000 worth.

▶ *St. Louis reports.* Latest check-up shows 150 exhibitors with 39 manufacturers preparing to display 72 planes.

▶ *Less trouble, more safety.* Annual accident report shows fewer mishaps per air mile in first half of '29 than in corresponding period of '28. Record for '29: one fatality for every 1,022,371 scheduled miles, for '28 one for every 896,922 mi.

▶ *This time it's O.K.* Bowlus officially keeps his Sailplane in air for 6 hr. 19 min. 3 sec., thus brushing aside recent 5½ hr. un-barographed venture.

▶ *Oil firm gets Jimmy.* Lieutenant Doolittle, airman *extraordinaire*, goes with Shell Petroleum Corp. as Director of Aviation.

▶ *Tempest pierced.* Seventeen of 22 Arctic Patrol planes attain Seattle after several are buffeted over Great Divide.

Airports and Airlines

▶ *Mail pay unsound.* Such is opinion of Postmaster General Brown who favors sliding rate scale based on mileage to replace system of pay by pound regardless of distance.

▶ *Still more slashes.* Aviation Corporation units cut fares in half. W.A.E. announces new reductions among results of which is $120 Kansas City-Los Angeles fare.

▶ *Postal estimates.* Committee on Appropriations assigns increase from $13,300,000 to $15,000,000 for transportation of domestic mail; foreign mail, from $4,300,000 to $5,100,000.

Foreign

▶ *Costes claims more records.* With Codos in Breguet "27" he is reported to have attained new speed, distance, and endurance marks for craft carrying 500 kilo (1,100 lb.) load. They are: speed, 140 m.p.h., distance about 2,500 mi.; endurance, 23 hr. 22 min. 49 sec.

Fliers Vie for Racing Honors At Miami All American Meet

Among Winners are: Williams, Little, Jackson, Nash, Davis, Stathan, Keightley, Bridges

BY HAROLD M. FARKAS

MIAMI (FLA.)—The All American Air Meet opened Jan. 13, here with the dedication of the municipal dirigible airport, the Goodyear blimps "Defender" and "Vigilant" being on hand. Because of bad weather to the north, many planes failed to arrive in time for the opening of the meet, but all were on hand for the second day's events. In Miami large crowds watched the meet from the stands, while clear skies contributed to the day's success. The meet was broadcast to the audience from loud-speakers by Swanee Taylor. As the first day neared the close, three Marine fliers arrived over the field and gave an exhibition of close-formation exhibition flying. With the first two planes flying wing tip to wing tip and the third plane between the tails of the other two, zooms and loops were deftly executed over the field before landing. Lients. W. R. Hughes, John S. Young and S. E. Schlelt piloted the planes. During the successive days of the meet the Marines, and three Navy pilots, who arrived later, performed between the scheduled events. An outside loop by Freddie Lund, and the looping and inverted flight of a Ford by Leo Allen, Curtiss-Wright pilot also were features.

Erreit Williams Jo on Englerock showo leading C. M. Nash, Minneapori. and Dale Jackson Cessna around a pylon in one of the races.

Among pilots whose race performances during the meet were outstanding were Errett Williams, Greenville, S. C.; C. M. Nash, Tampa; Dale "Red" Jackson, St. Louis; Art Davis, Melbourne, Fla.; Dick Stathan, Americus, Ga.; S. R. Bigony, Reading, Pa.; Henry A. Little, Jr., Philadelphia, and Jack Bridges, Jr., Wichita.

Officials Andrew H. Heermance, Miami director of aviation; Redge Waters, president of the Greater Miami Airport Assn.; Walter W. Bruns, general manager of the meet; J. E. Yonge, chairman of the Municipal Aviation Board, and Welton A. Snow, Miami City Manager, were among the prominent officials who made the meet a success. The races were flown over a five-mile triangular course at the Miami airport. A summary of each day's events with the winners follows:

First Day

Dick Stathan, flying a Bird, won first prize money of $150 in the opening event, a 15-mi. race for OX-5 3-place planes. His time in the race was 8 07.5 min. Second place, $100, was won by Harvey Hughes, Melbourne, Fla., flying a Challenger, in 9.01.5 min.; C. Descomb Hartford, Conn., also flying a Challenger won $75 for third place with

(Concluded on next page)

Chevrolet Goes With Martin

INDIANAPOLIS (IND.)—As reported at press time last week Chevrolet Aircraft Corp., this city, is being moved to Baltimore where it will be incorporated with the Glenn L. Martin interests with which it has become affiliated. The four cylinder in-line air-cooled "Chevolair" engine hereafter will be manufactured in a plant connected with the Martin firm. This power plant develops 90-100 hp. at 1,900-2,000 r.p.m.

Florida Tour Under Way

MIAMI (FLA.)—The Florida State Wide Air Tour, which started at this city on Jan. 16, is under way as we go to press. The tour started immediately following the All American Air Meet held here.

Fliers Vie for Racing Honors At Miami, Fla., Meet

(Concluded from page 65)

a time of 9 38 1 min Herbert M Toomey, Knoxville, Tenn, flying an American Eagle, won $50 for fourth place

Dale "Red" Jackson, St Louis, who with Forrest O'Brien, made the world endurance flight record from St. Louis last year, entertained the crowd after the first race with exhibition flying in a Curtiss Robin He attracted the spectators when he landed on one wheel, demonstrating how to land a plane from which a wheel had been lost. The second race, a 15 mi. free-for-all for planes of 110 hp, was won by Errett Williams with a prize of $150 He flew a Monosport, and his time was 7 09 1 min Dale Jackson, flying a Cessna started last but took second place, and $100 in 7 45 2 min; C M Nash, Tampa, flying a Monosport, won $75 and R. W. Scott, Washington, D C., in a Fleet, came in fourth to win $50 The second race was followed by an exhibition flight of the Sikorsky "San Juan" of the New York Rio and Buenos Aires Line with pilot Eddie Nirmaier at the controls

"Young" Stribling Takes a Hand

Art Davis won $200 for first place in the 15-mi race for open cockpit planes with 800 cu in displacement He was 1 min 30 sec ahead of Sam R. Bigony who won second money, $150, by finishing in 7 48 1 min, flying a Travel Air Dr J E Owens, flying an International, won $100 for third place, and Errett Williams, flying a Travel Air, $50, fourth place Others in the race were Granville B Smith, flying a Challenger, and W L "Young" Stribling in a Travel Air

First prize $200 in the race for 800 cu in. displacement cabin planes was won by H. A Little, Jr, in a Monocoupe His time was 7 18 min for 15 mi. C M Nash won second money of $150 in a Monocoupe, third prize $100 went to Dale Jackson in a Cessna, and $50 was taken by Van O'Brien in a Challenger.

Davis Wins Special Event

A special event for planes licensed only for racing was won by Art Davis, piloting a Waco, in 6.23 3 min Errett Williams was second in 6 41 1 in an Eaglerock. A B McMullen, third, in a Travel Air, J. E. Thropp, fourth, in a special Waco, and Dr. J. E Owens, fifth, in an International.

The bomb-throwing contest was won by Art Davis, when his marker landed 32 ft. from the target He was awarded $100 Sam R. Bigony, second $75, with a mark of 51 ft. 3 in Hugh L Woods, was third, and George M Keightley, fourth

Dr J. E. Owens won first prize in the dead stick landing contest with his International, coming within 36 ft of the marker Errett Williams, in an Eaglerock, was second with a mark of 50 ft

Silhouetted against cloud and sky—fliers rounding the south pylon at the All American Air Meet in the 800 cu in displacement open cockpit plane race held the final day

Third place went to Hugh L. Woods, and W F Cummings in a Challenger (tie)

Dale Jackson in a Cessna won the final event of the day, a 15-mi race for cabin planes of 300 hp The prize was $200 and his time 5.59 1 min His speed was 150 m.p h Harry A Little was second in a Monocoupe, George Haldeman, third, in a Bellanca; William Alexander, flying a Stinson Detroiter, fourth, and William Snowden in a Travel Air, fifth

Second Day

First prize in the 15-mi race for OX-5 class 3 place plane went to Dick Statham his Challenger, making the course in 8 10 1 min. to win $150 Other winners were Art Davis, $100, W F Cummings, $75, and Park P Reed, $50

The free-for-all 15-mi race for planes with engines of 450 cu in. displacement was won by Errett Williams, flying a Monosport, with a time of 6 23 min First prize was $150 Dale Jackson, second in a Cessna winning $100 C M Nash in a Monosport, winning $75 and Smith Reynolds taking fourth prize

Third race was for open cockpit planes of 800 cu in displacement. First prize of $200 was won by Sydner Hall in a Travel Air, in 5 33 2 min Art Davis, in a Waco, was second Ed Ballough in a Pitcairn Mailwing third and Fred Schwaemele, fourth in a Pitcairn Mailwing

This was followed by exhibition flying by the Connecticut National Guard in two Douglas planes piloted by Lieuts. H. H Mills and R. M Webster

The fourth race was a 15-mi. for 800 cu in cabin planes It was won by Jack Bridges flying a Cessna around the course in 6 31 min The prize was $200 H. A Little won second prize of $150 in a Monocoupe C M. Nash was third in a Monocoupe, and Dale Jackson fourth in a Cessna

Cabin Plane Race to Jackson

C M. Nash took first place in the bomb-dropping contest, coming within 7 yd 4 in of the marker in the center of the field Roger W Scott dropped his bomb within 50 yd 30 in of the ring in the center of the landing field for second H G Bissonnette third and Bill Alexander, fourth

The dead stick landing contest prize of $100 was won by George Keightley, flying an Eaglerock who landed 4 ft. 8 in. from the line Larry D Kuch was second, flying an American Eagle Wesley Raymond third flying a Bird and A B McMullen fourth

Dale Jackson won first prize $200 in the 300 hp cabin plane race flying a Cessna monoplane making the 15 mi course in 6 10 4 Jack Bridges was second, flying a Cessna, W L. Snowden followed flying a Travel Air, and Bill Alexander was next, in a Stinson Detroiter

Third Day

For the third time in three days, Dick Statham took the prize of $150 in the opening 15-mi race for OX-5 three-place planes, flying his Kinner Bird around the triangular course in [illegible] Arthur Davis was second, flying a Waco, and Laurie Yonge third flying a Bird.

Errett Williams took first place in the second race winning $150 by piloting his Eaglerock around the course in a flat time of 7 21 C M Nash was second, flying a Monosport Dale Jackson third, flying a Cessna Smith Reynolds fourth, flying a Monosport and Robert W Scott, fifth, with a special Fleet.

Art Davis won the 15-mi race for 605 cu in open cockpit planes, flying a Waco racer over the course in 6 22 Sydner Hall was second flying a Travel Air and At E Redmond third in a Travel Air

The 600 cu in. displacement race of 15 mi was won by Jack Bridges in a Cessna, with a time of 6 35 Henry A Little, Jr was second flying a Monosport, and C. M Nash was third, flying a Travel Air

C. B Brummwood won the bomb dropping contest. He came within 54 yd 4 in of the ring in the center of the field. Art Davis was second

The deadstick landing event was won by Hugh Woods flying an American Eagle His plane came to a stop 5 yd 6 in from the chalked line Art Davis was second in a Waco and W L. Stribling in his Travel Air third

The final event of the meet was the 15 mi race for 300 hp. cabin planes which was won by Dale Jackson in his Cessna. His time was 6 09 2 Jack Bridges was second in a Cessna W L. Snowden third in a Travel Air and Henry A. Little fourth flying a Monosport

Late in the afternoon, 15 jumpers dropped from the giant Sikorsky land plane "North ern Star" from Tampa and floated to earth without mishap. Three others dropped to the field from the Goodyear Dirigible "Defender."

Davis Officials Visit Distributors

RICHMOND (IND.)—All Davis distributors in the Western territory will be visited by Walter C Davis, president of the Davis Aircraft Corp, on an extended business trip which started from here recently Other Davis sales activities include a trip by Cy Younglove, Davis pilot and salesman who has left for Fort Worth, Tex., and C. Shirley Reitzel, also a Davis pilot and salesman, who is now making a tour of eastern Davis distributors as well as calling on prospective distributors in various sections

"Arctic Patrol" Planes Reach Spokane 17 Strong

SPOKANE (WASH)—The "Arctic Patrol", with seventeen of 22 starters, reached Newman Lake on Jan 19 The Patrol had been buffeted by gales, and temperatures of 30 below zero were common after leaving Selfridge Field

After a brief pause at Great Falls, Mont, the group re-assembled and prepared for the final dash to Spokane Five of the planes were left east of Great Falls having been forced out by weather conditions On Jan 17 the seventeen remaining planes left Great Falls and high over the Continental Divide ran into real trouble A terrific wind was blowing which increased as the machines flew into it The Ford transport, with nine mechanics aboard, and three pursuit planes succeeded in getting through, the rest put back to Great Falls. The next day it was the same, and this time engine trouble developed The low temperatures made repairs next to impossible With the aid of a steam boiler loaned by city officials the planes were warmed and got off on Jan 19 and succeeded in crossing the Divide.

The clothing designed for the flight proved warm but the pilots hands and feet suffered The planes flew formation over the entire route. It was necessary for the pilots to crank and repair their own planes after the Ford carrying the mechanics became separated from the main flight At no place along the route were the planes placed in hangars

Chance Vought Gets 36 Plane Navy Order

LONG ISLAND CITY (N Y)—Chance Vought Corp, this city has received a contract from the Navy Department for 36 Corsair observation planes officially known as the "03U-1" type According to the report given out concerning the deal, the contract price is $856,812 50

These planes will be similar to the 02U planes now being used by the Navy, the main difference being a change of the wing section The 03U-1 machine will be of amphibion type, being convertible as either a sea or land plane They are two-place craft, equipped with Pratt and Whitney "Wasp" engines and are expected to be used aboard the battleships and airplane carriers of the fleet for spotting and observation duties

Braniff Heads Investment Firm

OKLAHOMA CITY (OKLA)—Aviation Shares, Inc, has been formed as a $1,500,000 investment firm dealing in aviation stocks and securities This new company, which has already purchased shares in several aviation concerns, is directed by Paul Braniff, founder of Braniff Airlines, president, Judge Fred B Owen, vice-president; and C A Thompson of the Federal Tax Co., secretary-treasurer Though chartered in Arizona, offices are maintained here.

Glider License to Lindbergh

SAN DIEGO (CALIF)—Col Charles A Lindbergh has qualified for a first class glider pilot's license, following a half-hour flight in an engineless craft. Lindbergh flew a half mile out over the ocean, and attained a 500 ft altitude. William Van Dusen, local representative of the N.A A, officially checked the flight which was made in a Bowlus Sailplane.

Special Boeing P-12 Flown at 196 M.P.H.

SAN DIEGO (CALIF)—A speed of 196 m p h at an altitude of 8,000 ft. was officially attained here recently with an improved Wasp powered Boeing P-12 equipped with a special Boeing engine cowling somewhat similar in design to the Townend Ring developed in England by Sir W G Armstrong Whitworth Aircraft, Ltd Fliers attached to the Aircraft Squadrons, Battle Fleet, and the 95th Pursuit Squadron, Army Air Corps, tested the plane, which was stated by the Boeing firm to have reached a speed of 209 m p.h in the hands of Boeing pilots at Seattle

The new plane approximates in appearance the Boeing F 4B Navy fighter and the Boeing P-12 Army fighter Its essential differences, which give it an added speed of some 25 m p h, consist mainly in a higher compression Wasp engine (six to one), a supercharger which begins to function at an elevation of 5,000 ft, the special cowling, and an improved and lighter landing carriage with smaller wheels

For the Navy, Lieut Comdr J H Campman and Lieuts J D Barner and George Henderson flew the plane, while for the Army, Capt H M Elmendorf, commanding officer of the 95th Pursuit Squadron and Lieuts I A. Woodring and K G Gregg undertook the tests Immediately prior to the speed tests, Army pilots with another Wasp-powered Boeing P-12 set a new altitude record for a fighting airplane, climbing to 30,000 ft with full military load Lieut G E Price later attained 31,700 ft. in the same plane without the fighting equipment installed in the airplane

William A. Matheny Receives Cheney Award

WASHINGTON (D.C.)—The latest Cheney Award is to be received by Sec Lieut William A Matheny following the recommendation of a Board of Air Corps Officers, consisting of Brig-Gen. William E. Gillmore, Assistant to the Chief of Air Corps, Lieut-Col Ira Longanecker, Chief of the Information Division, and Maj L. W McIntosh, Executive Officer in the Office of the Chief of Air Corps

The Cheney Award which is given annually in recognition of an act of valor and self sacrifice provides $500 in cash for the officer or enlisted man in the Air Corps or Air Corps Reserve who wins this recognition With the cash award goes a bronze plaque and an engraved certificate

Second Lieutenant Matheny's act which won for him this honor, occurred at Managua, Nicaragua, on Aug 30, 1929 Lieut Dwight Canfield and Sergeant Wright took off from Managua, Nicaragua, in a bomber piloted by Lieutenant Matheny and when about seven miles outside of Managua, the left engine of the plane caught fire and the overtaxed right power plant stopped Unable to use their parachutes because of low altitude, Lieutenant Matheny was forced to land the plane in the jungle

Drags Canfield From Wreckage

Sergeant Wright and Lieutenant Matheny were thrown clear of the plane as it crashed, but Lieutenant Canfield was caught in the wreckage which burst into flames when the gas tanks broke Both Canfield and Matheny had been saturated with gasoline and Canfield was immediately enveloped in flames Seeing his companion's plight, Matheny disregarded his own safety and bravely rushed back to the plane and dragged him away at the same time catching fire himself He attempted to smother the fire on both Canfield and himself, but while doing so Canfield ran away. Extinguishing his own flames, Matheny went in search of Canfield to find him sitting on a jungle road no longer afire. Some hours later aid arrived, but Canfield died of injuries he sustained.

Lieutenant Woodring about to take off in the special cowled P-12

Chamber Reports On 1929 Production

Value of Planes, Engines, Parts Put at $98,000,000

NEW YORK (N Y)—Planes, engines, and spare parts produced by the American aircraft industry during 1929 represented a total of $98 000 000, according to the annual copyrighted production report of the Aeronautical Chamber of Commerce

The 6,034 commercial and military craft produced by 96 major aircraft manufacturers represented a total retail value, without engines, of $44,457,300 60 Of this number, 5,357 craft were produced for commercial use at a value of $33,624,756 60 while 677 military planes represented $10,832,544 without engines

The report of 25 aircraft power plant manufacturers showed a total of 7,378 engines produced during the last year for both military and commercial use, with a total value of $26,495 830 15 The commercial market absorbed 5 517 power plants worth $17,895,300 while the 1,861 military engines represented a value of $8,600,530 15

Increase is $30 000 000

The $98,000 000 plane, engine, and parts production during 1929 shows a great increase over the 1928 figure when the planes, engines, and spare parts represented $62,000,000

This means that there was an increase of 3 667 units or 193 per cent in the commercial production of engines, and an increase of 1 815 or 51 per cent in the manufacture of commercial aircraft. Military engine production was 448 units higher in 1929 than in the preceding year, representing an increase of 32 per cent The manufacture of planes for military consumption during the past year experienced a slump however, falling 44 per cent below the 1928 figures

Total plane production for 1929 showed a 27 per cent increase over 1928 despite the slump in military production Commercial aircraft production without engines for the past twelve months, showed a 96 per cent rise in valuation over 1928, or $16,430 458 60 In engines, the combined production of military and commercial power plants showed an increase of 4 115 units or 126 per cent. The value of commercial engines was $8 958 575, or 100 per cent higher than in 1928

Engine Unit Price Lower

Commercial aircraft engine production showed an average unit price of $3,243 65 during 1929 as compared with $4 830.65 in 1928 The average unit value of all types of aircraft, including power plants, was $9,520 as compared to $9 685 15 in 1928. The lower average engine price resulted from the entrance of the lower power new production engines into the field.

Most of the engines produced were in the class above 300 hp There were 1,404 engines rated above 300 hp manufactured during the year with a total retail valuation of $8 727 100 The second largest number fell in the class between 76 and 125 hp, with 1,309 units valued at $2,013 750 The third largest group was rated between 126 and 175 hp, with 1,208 engines valued at $3,158,000

In the class below 75 hp, 479 engines valued at $367,950 were produced, a large number for this low horsepower group Between 176 and 225 hp, 656 engines valued at $1 638 500 were manufactured, and in the 226 to 300 hp class, 552 units were made with a valuation of $1,990,000

Analyzing the production reports of the 96 major aircraft manufacturers, the report says that open cockpit biplanes led all others in the number produced as to type, with cabin monoplanes second However, of all types produced during 1929, amphibions showed the greatest increase over 1928 The cabin biplane was the only type to show a decrease in the number produced when compared with 1928 Furthermore

"Amphibions increased 363 per cent, showing a marked interest in this versatile type Multi-engined monoplanes increased 207 per cent over 1928, flying boats and seaplanes, 190 per cent. Open cockpit monoplanes increased 81 per cent closed cockpit monoplanes, 80 per cent; multi-powered biplanes, 60 per cent, and open cockpit biplanes, 30 per cent. The closed cockpit biplane decreased 32 per cent below the 1928 totals.

"In 1928, there were more than 124 per cent more biplanes than monoplanes of all types, while in 1929 only 51 per cent more biplanes were manufactured The ratio between biplanes and monoplanes was rapidly shifting in favor of the monoplane.

"The average unit value, without engines, of airplanes produced during 1929 was $6 276.35, an increase of $1,425 25 more than in 1928 when the average unit value was $4 854 50. The marked increase in aircraft unit values can be attributed to the largest number of multi-engined transports, amphibions and flying boats, with values ranging from $50,000 to $150 000 manufactured during 1929."

The aircraft production report is one of a score on vital statistics affecting aviation which are included in "The Aircraft Year Book for 1930" compiled, written and edited by the Aeronautical Chamber of Commerce and published for the chamber by the D Van Nostrand Co., of New York The nineteen chapter headings indicate the scope of the book, which is the twelfth consecutive edition to be published since 1919. Reflecting the Trends in Aviation, Aircraft Production and Operations, Air Transport Progress, Aviation Radio Aerial Service, Aircraft Manufacturing Engine Manufacturing, Airship Development, History Making Flights of 1929, Refueling Endurance Flights, Exploration by Air, Military Aviation, Government Civil Aviation, Airports and Airways, Private Flying, Aeronautical Legislation, World Aviation in 1929, and Trends in Design. A complete Aircraft and Engine Design Section Chronology, Appendix, and Trade Index are included in the 1930 book of more than 500 pages 200 illustrations and 150 line drawings

Honor Wheels-Up Landings With Cup

LUKE FIELD (HAWAII)—A loving cup (wooden) has been donated by Maj Maxwell Kirby, commanding officer here, for competition among flying officers in landing Keystone-Loening Amphibions on dry land with their wheels up Each of such landings earn a pilot the doubtful honor of one handle on the trophy, and thus far six fliers have qualified, unpremeditated though that qualification may have been To date, no damage has been reported as sustained by the planes in these accidental "sittings"

NEW PLANES

Testing of the new four place American Eagle Cabin monoplane, which will be shown for the first time at the St. Louis show, virtually has been completed E E. Porterfield, president, says the performance of the plane is entirely satisfactorily and that its speed and other flight characteristics exceeded the expectations of the engineers

A so-called "mystery plane" is being built at the factory of the Butler Aircraft Corp Kansas City Of all metal design it is being constructed under the direction of Dr Walter Cross and Jack Foster, formerly with the American Eagle Aircraft Corp Details concerning this new plane have not been given out but it is understood it will be a multi-engined craft

There was recently tested out at Wichita, Kan, the first Yellow Air Cab plane, a Hilton Super, mid wing monoplane which was brought out here several months ago and has been taken over by the Yellow Air Cab Co as its first flying unit

The first public showing of the "Gee Bee" plane constructed at Holyoke Mass will be at the American Legion Aircraft Show which will be held at New York City in February Zantford D Granville president, states that the craft was recently put through flying tests.

The second tests of the small Palmer monoplane were made on the beach at Old Orchard Me recently. This craft has a wing span of 40 ft and is slightly over 1,000 lb. in weight It was designed and built by Henry Hunt of Providence and employs an engine constructed by Harry A Palmer of Milton, Mass

Invincible to Build Factory

MANITOWOC (WIS.)—Preparations are being made by the Invincible Aircraft Corp here, to build a $50,000 factory, where the manufacture of planes is expected to be under way by next summer

New F-32 Now Ready For Western Air Express

HASBROUCK HEIGHTS (N J)—According to Capt. E V Rickenbacker, vice-president of the Fokker Aircraft Corp here Western Air Express will soon take delivery on a new F-32 craft, preliminary tests of which have been completed and declared satisfactory

At this writing the first public flight of the plane is scheduled to take place at Newark Airport on Jan 21 and groups of distinguished guests will be taken for flights, among whom will be New York Police Commissioner Whalen, who will broadcast over the two-way radio telephone in the machine which has been installed under the personal supervision of Herbert Hoover, Jr, radio engineer for W A E.

Western Air Express will then stage an aerial house party aboard the F-32, flying a party of guests from New York to Los Angeles with stops at five intermediate cities The craft will stop at Detroit, Chicago, St. Louis, Kansas City and Denver en route A vaudeville program is to be broadcast over a nation-wide hookup during various stages of the journey through an arrangement with the Fox theaters.

The Fox firm has arranged a contest in which winners in the audiences of several theaters will be given tickets entitling them to a free ride in the plane while it is at the Newark Airport The F-32 is scheduled to reach Los Angeles on Feb 1.

Limitation Rule Checks Corps

WASHINGTON (D C)—Were it not that the legal limitation of the total number of Army officers to 12,000 prevented the giving of regular commissions in any considerable number, there would be no difficulty in making up the shortage in Army Air Corps personnel out of the number of civilians admitted to the service schools as flying cadets and approved as suitable material upon their graduation, said General Fechet Chief of the Air Corps in his recent House report Some of these are accepted for a protracted period (one year or more) of active duty, stated the General At present, there are only about 130 officers so serving, but funds approved by the House Committee on Appropriations would permit an increase of this number to 322 during the next fiscal year.

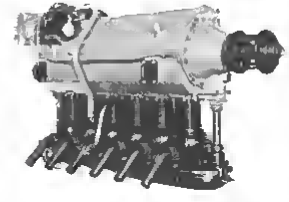
Slightly More Army Accidents

WASHINGTON (D C)—The total accident rate for the Air Corps increased slightly for the past fiscal year, although the record still remains superior to any previous year with the exception of 1928 according to the report recently given in the House by General Fechet, Chief of the Air Corps For the fiscal year 1928, the Corps had flown 7,318 hr for every fatal accident, and 6,774 hr. for each fatality For 1929 those figures dropped to 6,270 and 4,316 respectively

Lieutenant Doolittle With Shell

ST. LOUIS (MO)—An announcement from the headquarters of the Shell Petroleum Corp, states that they have retained Lieut James H Doolittle as Director of Aviation In the appointment of Lieutenant Doolittle to direct its aviation activities, is seen the first step in an aggressive aviation expansion program already planned and partly under way by the oil company. This program forecasts the early purchase of a number of additional planes to adequately cover the 28 states in which Shell aviation products will be demonstrated

Fairchild's New Plant



HERE IS THE NEW 110 hp 370" engine production of which is planned by the Fairchild Engine Corp, a subsidiary of the Fairchild Aviation Corp Farmingdale, L I N Y The power plant of the six-cylinder in-line inverted air-cooled type was developed by Walter E. Davis chief engineer, and his staff. Mr Davis heads the engine corporation, which began to function last May

The first power plant of this line was completed and mounted on the belting-in stand Nov. 18, five months and eighteen days after the initial drawing A series of tests, reported to have shown the plant highly satisfactory, were finished Dec 16 following which the engine was announced to the industry (AVIATION, Dec 28, 1930).

Air Doctors to Meet at Omaha

COUNCIL BLUFFS (IA)—Twenty middlewestern physicians of the aeronautical section of the medical division Department of Commerce, are scheduled to attend a conference Feb 18 and 19 at Omaha The meeting will be held at the Athletic Club and will be in charge of Dr John A Tamisiea. Dr. H J Cooper, assistant chief in the service from Washington, D C, will be present to conduct the sessions of the conference. The special social feature of the meeting will be a banquet the last evening

Berkeley Orders 12 Parks

EAST ST. LOUIS (ILL.)—Berkeley Aviation Services, Ltd, Berkeley, Calif, has ordered twelve Parks planes

Many Orders Booked By Irving Chute Company

BUFFALO (N Y)—Sufficient business has been booked by the Irving Air Chute Co, Inc, of Buffalo to insure capacity production in the local plant until May with all of the Western business transferred to the new Pacific Coast branch at Long Beach. Calif, it is announced by George Waite president of the company

Several important foreign military contracts have been booked by the company, but Mr. Waite reports that owing to military censorship covering future contracts of this type the company is unable to release the names of the governments for which the parachutes are being made or the amount involved During the current year however government orders, Mr Waite indicated, will constitute less than 50 per cent of the company's total volume because of the large number of chutes being produced for commercial purposes, including commercial transport companies

The Irving Air Chute Co has just completed its first order for the Russian Soviet government and it was said that negotiations are now pending between the Soviet leaders and Leslie L Irvin, vice-president and European manager of the company for a large re-order The branch plants in Warsaw Poland, and Letchworth, England, Mr. Waite said are on a normal production basis and it is possible that additional foreign plants will be established this year on a basis somewhat similar to the Polish unit which is owned by the government but operated by the Irving Air Chute Co, under a long term contract

Light Firm Makes Brownbacks

POTTSTOWN (PA)—The Light Manufacturing & Foundry Co, of this city has begun production of the Brownback-Tiger C-400, 6 cylinder, 90 hp radial air-cooled engine. This engine has approved type certificate No 33 George W Kirkendall, the company pilot, is making a demonstration tour of the East and Mid-West Charles H Phelps president of Brownback Motor laboratories, Inc, will become a director of the Light Manufacturing & Foundry Co Vice-president, Henry L Brownback, is one of the consulting engineers in the aeronautical department, and Bronson H Davis, who had charge of the Brownback sales, is also with the organization

Bendix Gets Stinson Order

CHICAGO (ILL.)—Vincent Bendix, president of the Bendix Aviation Corp, states his company has received an order from the Stinson Aircraft Corp, which calls for 500 Scintilla magnetos, 500 Stromberg carburetors, 500 Bendix aviation-type brake sets, 300 sets of Eclipse electric starters, and 300 sets of Pioneer instruments

Report Decrease In Aero Accidents

Fewer in First Half of 1929 Per Mile Than in 1928 Period

WASHINGTON (D C)—In the semi-annual report of aircraft accidents issued by Clarence M Young, Assistant Secretary of Commerce for Aeronautics, a marked increase is shown in the number of miles flown for each accident in civil aeronautics during the first six months of 1929, compared to the same period in 1928.

Between January and June, 1929, a total of 56,201,338 mi were flown by civil aircraft in this country, which figure represents more than three times the number of miles flown during the first six months of 1928 This mileage represents air transport and miscellaneous operations which include passenger, mail or express service on scheduled routes and miscellaneous operations such as student instruction, experimental, commercial and pleasure flying

Only nine fatal accidents occurred for the 9,201,338 scheduled miles flown in air transport operations in that period Mileage flown for each fatal accident was therefore 1,022 371 In 1928 over the same length of time there were 4,484,612 mi flown and five fatal accidents, the proportion thus being one fatal accident for every 896,922 mi

Miscellaneous Flying Takes Toll

Considering all classes of accidents, including those referred to above as well as all others, the miles flown per accident in scheduled air transport operations for the first half of 1929 totaled 153 306 as there were 60 accidents For the corresponding period in 1928 the total number of accidents reported was 35, which placed the miles per accident at 128 132

As there was a total of 47 000 000 mi flown in miscellaneous operations in the 1929 period, and as there was a total of 118 fatal accidents, the miles flown per fatal accident in this class of flying amounted to 398,305, while in the same period in 1928, the total mileage was 12 000 000, the number of fatal accidents was 92, and the miles flown per fatal accident numbered 130,435.

Fatalities for '29 Period 127

The total number of all classes of accidents reported in the 1929 six-month period in miscellaneous operations, was 714 which brought the miles per accident in miscellaneous operations to 65,826 This mileage per accident was more than twice that for the same period in 1928 as the records show but 30 380 mi flown per accident in that period This latter figure is based on a total number of accidents for that period of 395

Carried out further to take in the total mileage flown in all classes of aircraft operations for each fatal accident, the figures show there was one fatal accident during the first half of 1929 for every 442,530 mi. flown The total number of fatal accidents for this period was 127, while the total miles flown was more than 56,000,000, as previously set forth. For the corresponding period of 1928, however, the number of fatal accidents in all classes of operations was 97, the miles flown were 16,484,612, giving a total mileage per fatal accident in all classes of flying of 169,944

From the standpoint of mileage flown per accident in all classes of civil aircraft operations and for all classes of accidents throughout the United States for the first half of 1929 the figures show an increase of almost 100 per cent over the corresponding period of 1928. There was a total of 774 accidents in the first six months of 1929, which placed the total mileage per accident at 72 612 For the first half of 1928 there were 430 accidents of all kinds and a total mileage of 38 337 per accident for all classes of operation

It will be noted that direct comparisons only have been made between the mileage flown and the number of accidents in the first half of 1929 and the first half of 1928 This was done because weather conditions during the last six months of the calendar year are more favorable for flying than during the first six months, and obviously, the last half of the year has the advantage over the first part

The Aeronautics Branch believes that due to the shortage of field personnel for carrying on the work there doubtless were some unreported accidents in 1928, in which event, the increase in mileage flown per accident for 1929 over 1928 would be even greater than shown in this report

The causes of the accidents are divided into four major classifications—personnel, power plant failures, airplane failures, and miscellaneous There is a fifth category given over to undetermined and doubtful causes.

The largest percentage of the accidents was attributed to personnel the total being 50 04 per cent. The next largest cause was credited to power plant failures which amounted to 18 05 per cent. Airplane structural failures contributed 8 80 per cent, and miscellaneous 9 38 per cent In the miscellaneous class, weather was credited with 5 05 per cent airport and terrain 2 79 per cent darkness 0 61 per cent and other causes not falling under the general classifications 1 64 per cent. The percentage of undetermined and doubtful causes was 4 78 per cent

The accident report is based on the findings of the accident board of the Aeronautics Branch which is composed of two expert pilots a flight surgeon an aeronautical engineer, a lawyer versed in air law and a statistician This Board investigates and determines the causes of all civil aircraft accidents analyzes all accidents reported from the field and reduces them to their causation factors expressed in percentage The statistics gathered from the work of this accident analysis have proved to be of great value, particularly by pointing to ways and means of decreasing the number of aircraft accidents. They also are of great assistance in the development of certain structural and flying characteristics in aircraft

Printed copies of the complete report, giving comparative statistics and analyses of accidents in civil aeronautics for the years 1927 1928 and the first six months of 1929 are available without charge upon request to the Aeronautics Branch Department of Commerce

Schlee-Brock Sell Used Planes

DETROIT (MICH.) — Schlee-Brock Aircraft Corporation has opened up a used plane department here F. R. Coe has been appointed manager of the Schlee-Brock department, which now has eight planes for sale

Engine Test Apparatus at Arlington Laboratory

SHOWING THE CONTROL ROOM of the new government aircraft engine testing laboratory at Arlington, Va In order to protect the observers the next room, in which the engines are mounted, is heavily reinforced with concrete to act as a safeguard against the possibility of flying parts from test-weakened power plants Dr H. C Dickinson, chief of the Heat and Power Division of the Bureau of Standards, is examining the apparatus.

Richfield Oil Firm Has N. Y. Aviation Office

NEW YORK (N Y)—Fred L Foster is to head the new aviation department of the Richfield Oil Corp here which opened its New York Office about six months ago Mr Foster, who is an experienced flier, has been connected with commercial aviation in the field of engine fuel experimentation

This new department will follow the policy of the company's California Bureau, which has been responsible for the installation of a $10,000 000 system of beacons which stretch from Vancouver to the Mexican Border The western division has also distributed thousands of aviation maps in the California area

Mr Foster has been identified with aircraft development and experimentation for the past eighteen years and has done work in association with Dr. George Grainger Brown, chief of the Department of Chemical Engineering, University of Michigan, and Dr O C Bridgeman of the Bureau of Standards, Washington, D C. Richfield is now making use of the data, which Mr Foster has gathered, in the manufacture of aviation gasoline, lubricating oils and high pressure rocker arm grease Mr Foster's assistant is Rud J Babor

James A Talbot, chairman of the Richfield Oil Co of California and a member of the board of the New York corporation, is also chairman of the board of the Fokker Aircraft Corp., president of Western Air Express, and chairman of the board of Standard Air Lines

A.S.M.E. Meetings Scheduled

DAYTON (OHIO)—Announcement is made here by the Dayton committee of the A S M E., Aeronautical Division, that Orville Wright had accepted the honorary chairmanship of that body. The committee is planning for the annual meeting of the organization at Wright Field, May 19-22, inclusive This will be the principal gathering of a series scheduled this year The program will consist of the reading of 30 papers and the witnessing of tests at the field by prominent aeronautical engineers of this and foreign countries Two New York meetings will be held, one Feb 14 and the other in May during the Aeronautical Chamber of Commerce show, a Pittsburgh air show meeting is scheduled for March 12

Pontiac to Run Michigan Tour

PONTIAC (MICH.)—By Decision of the National Aeronautics Association, Pontiac will sponsor the second Michigan Air Tour, to be held some time in the early summer of this year Both Pontiac and Jackson had applied to the N.A.A. for sanction of the tour, but as Pontiac had previously conducted the first one, Hugh I DuBose, assistant secretary of the association, notified the city that its claim would be recognized

Open L. I. Russell Chute Station

NEW YORK (N Y)—Air Associates, Inc, which conducts a sales service for the Russell Parachute Co, announces it has established a fully equipped parachute service department in building No 19, Roosevelt Field, L I. The personnel will include a Russell factory representative and an expert jumper and packer. A packing table and complete stock have already been set up.

State Bowlus Flight Breaks Several Records

SAN DIEGO (CALIF.)—Several records for American gliding were believed broken by W. Hawley Bowlus, of this city, when he recently flew above Point Loma for 6 hr 19 min. 3 sec. during his most recent attack on the world's sail plane soaring record. Bowlus not only broke the American endurance record for soaring flight (exceeding his own record for the fourth time in three months by surpassing a mark of 5 hr and 25 min. set recently) but he is believed to have broken the former American altitude soaring record of 400 ft by having flown to more than 1,000 ft above his starting point, and he is believed to have made the first extended night flight by an American glider pilot.

The flight was timed by N.A.A. officials, and Bowlus carried a sealed barograph which has been forwarded to Washington for calibration Taking off at 1 15 a.m. Monday morning, Jan 13, Bowlus flew his sailplane for more than six hours through rain and clouds For more than an hour of his flight the sky was entirely obscured and no landmarks were distinguishable with the exception of the Point Loma light and an emergency bonfire built on the point by the glider ground crew.

P. & W. Get Wasp Junior Orders

HARTFORD (CONN.) — Pratt & Whitney Aircraft Co announce that orders are being received for the Wasp Junior 300 hp engine which was recently granted an approved type certificate. Among the companies which have placed orders for this new power plant, are Ford, Sikorsky, Stearman and Ryan According to announcements, the first installation of the Wasp Junior in a craft built for that engine will be made by the Stearman Aircraft Corp, Wichita, Kansas, within the next month or so

Axelson Firm Name Changed

LOS ANGELES (CALIF.)—The Axelson Machine Co, parent organization of the Axelson Aircraft Engine Co., has changed its name to the Axelson Manufacturing Co, Ltd The new company will continue under the same management as before. The manufacture of Axelson aircraft engines, which is conducted in a separate factory, will continue uninterrupted

Army Lighter-Than-Air To Be Augmented in '31

WASHINGTON (D C.) —Lighter-than-air activities of the Army Air Corps, which were not augmented for the present fiscal year, will be somewhat enlarged during 1931, according to the report on appropriations submitted to the House of Representatives by the subcommittee of the War Department

Approximately $200 000 is assigned in the bill to all lighter than-air activities, including purchase, maintenance and operation The purchase of one non-rigid airship and envelope, one observation balloon, four barrage balloons, and accessories, are provided for in the bill. No item is included for the procurement of helium as the supply on hand, plus purchases during the current fiscal year, is expected to take care of requirements to the end of the fiscal year 1931

Many of the lighter-than-air craft now on hand are not in serviceable condition, and more are having to be placed out of commission On June 30, 1929, the Air Corps possessed sixteen non-rigid airships and 26 envelopes, 40 spherical, and 28 observation balloons On Dec 10, 1929, only five of these airships were in commission

For the last two years the lighter-than-air program of the Air Corps has been in an uncertain status In 1929 the total appropriation for this branch was $13,000, while nothing was appropriated in 1930 There seems to be disposition on the part of Congress to hold aloof from development of this division until it has been decided whether the Navy shall take it over or not. In testimony before the House Appropriations Committee, General Fechet, Chief of the Air Corps, emphasized the unwisdom of allowing the fighter-than-air branch to dwindle below its present meager status He expressed the view that though the peace-time need for this type of equipment is not great sufficient aircraft should be provided for training and experimental purposes

Douglas Dividends Reported

NEW YORK (N Y) — Reports received here tell of stock dividends declared by the Douglas Aircraft Co., Santa Monica, Calif A $0 50 dividend amounting to $403 364 for the year ending Nov 30, 1929 was announced by the directors, this being equal to $1 19 per share on 338,692 shares against $1 38 per share on 300,000 shares for the year ending Nov 30, 1928 Announcement is also made of an initial dividend of $0 75 per share payable March 19 to owners of record Feb 7

Plan Camden Show Mar. 22 - 29

CAMDEN (N J.)—From March 22nd to the 29th, inclusive, the Camden Chamber of Commerce, in co-operation with the Camden Chapter of the National Aeronautic Association, will conduct the Eastern Aircraft Show in Convention Hall here.

St. Louis Space To 150 Exhibitors

Total of 72 Airplanes Listed by 39 Manufacturers

ST LOUIS (MO)—While still three weeks away, the International Aircraft Exposition has an outstanding list of entries At this writing, 150 exhibitors have been allotted space at the Arena, 39 of them being plane manufacturers Seventy-two planes have been allotted space.

The St Louis Arena offers many advantages for the exhibition of planes, chief among which may be cited the large amount of room given each exhibit and the landing field adjacent to the building which means that planes need not be taken down to be placed in the halls

Pre-Showing for Scouts

Elaborate plans have been formulated to attract the Central and South American aeronautical groups to the Exposition. Many features will be held throughout the entire show A special pre-showing is scheduled Jan 15 for Boy Scouts

Following is a list of the manufacturers showing planes These makes will include sport training, open and closed standard planes, multi-engined transports, seaplanes and amphibions; also many premier models. The list is as follows: Aeronca, American Eagle, Avro-Avian, Bellanca Bohl, Cardmal, Cessna, Command-Aire Curtiss-Robin, Dare, Davis, Driggs, Earle, Eastman, Fairchild, Fleet Flying Dutchman, Fokker, Ford, Great Lakes, Ireland, Keystone, Lincoln Lockheed Loening, Mono Aircraft Moth N-B3 Barling, Parks, Pitcairn, Ryan Savoia-Marchetti, Spartan, Stearman, Stinson, Stabilaire, Travel Air, Verville, and Waco

New Entries Listed

Since first reported in AVIATION (Dec 21, 1929) the list of entries has grown much larger Planes, engines and accessories are represented in the new exhibits. Following is a list of those exhibitors not previously mentioned (an initial list of the first 56 exhibitors will be found in AVIATION for Dec 21):

Aero Corp. of America, Aero Supply Co Air Reduction Sales Co., Air Travel News, Airway Age American Aeronautical Corp. American Eagle Aircraft Corp., American Tel & Tel. Co. Associated Oil Co. of Cal., Aviation, Aviation Engineering, Axelson Aircraft Engine Co. Balsa Wood Co. E. B. T Corp Bellanca Aircraft Corp. Bethlehem Steel Corp. Black & Decker Mfg. Co. Boeing Airtransport System Boeing School Bohn Aluminum & Brass Co. Breese Corp. Buhl Aircraft Corp. Cessna Aircraft Corp. Command-Aire, Inc., Consolidated Instrument Co. John S. Cox & Son Curtiss-Robertson Aircraft Co., Curtiss Aeroplane & Motor Corp. Davis Aircraft Corp., Driggs Aircraft Corp. Earle Aviation Corp. Eastman Aircraft Corp. Eclipse Machine Co., Elgin National Watch Co., Fairchild Airplane Mfg Co. Fleet Aircraft Co, Inc., Ford Motor Co.-Stout Metalplane General Electric Co. Great Lakes Aircraft Corp. Gruss Air Spring Co. Hall & Brown Wood Wkg Mac Co. Hamilton Stand. Steel Prop. Co., Ireland Aircraft Inc Jefferson School of Aviation Jay Manufacturing Co. Keystone Aircraft Corp. Lambert Aircraft Corp. LeBlond Aircraft Eng. Co. Lincoln Aircraft Co., Linde Air Products Co. Lockheed Aircraft Co. Loening Mfg. Co. Luminous Products Co., McQuay-Norris Mfg Co. Michigan Aero Engine Corp. Modern Mechanics, Monu Aircraft Corp., Moth Aircraft Corp. New Standard Aircraft Corp. Packard Electric Co. Parks Air College Pioneer Instrument Co. Pratt & Whitney Aircraft Corp., Quaker State Oil Co. Radiomarine Corp. Rand-McNally Co., Ryan Aircraft Corp. St Louis Car Co., Scintilla Magneto Corp. Shell Oil Co. Sinclair Refining Co. Skelly Oil Co. Southern Aviation Southwest Air Fast Express, A. G. Spalding & Bros., Spartan Aircraft Co. Stanavo Specification Board Stearman Aircraft Co. Stinson Airplane Corp., Stabilaire Inc. Stewart-Hartshorn Co. Stromberg Motor Devices Inc., Summerill Tubing Co. Switlik Mfg Co. Szekeley Aircraft & Eng. Co. Taylor Instrument Cos., Timken Roller Bearing Co., Travel Air Airplane Co. Universal Flying School Universal Metal Products Co. Verville Aircraft Corp. Warner Aircraft Corp., Western Flying Welding house Lighting Institute, and Whitehead Mfg. Corp.

Representatives Named

BACH—Roy L. Nafziger, Kansas City, Mo.

CURTISS-WRIGHT SALES CORP.—D. C. Warren, for the northern part of California and Nevada. Mr Warren will appoint dealers and retailers throughout his territory.

BARLING NB-3—Air Services, Inc., Waco, Tex., which has made a contract with the Nicholas-Beazley Airplane Co., Inc. for twenty-two of the planes equipped with LeBlond, Velie, and Genet engines

Makes Fast Miami-N.Y. Trip

NEW YORK (N Y)—Lee Schoenhair, flying a Lockheed Vega recently made the trip from New York to Tampa (1,100 mi.) in 7 hr. 50 min., an average of 150 m.p.h. This time sets a new record for the journey

Automobile Truck Fitted to Carry Airplanes

FINDING A DEMAND for the transportation of "knocked down" airplanes, K. N. Hyrup of San Leandro, Calif., has equipped his truck with a special body to carry the wings and fuselage of a plane as shown above. Brackets on either side of the chassis firmly hold the leading edge of the wings. Being near to the ground, these brackets facilitate the loading of the heavy wings on to the truck. The tail of the plane is then hoisted between the two wings and rests on the body of the truck, utilizing the plane's own wheels in trailer fashion. The truck has transported many of the machines used in air pictures.

New Firms Announced

SOLAR AVIATION CO., Mobile, Ala., capitalized at $24,000, with a paid-in capital of more than $11,000, by E. E. Masser, Henry McCarty, E. W. Lingfelter, and L. M. Lingfelter, to do a general line of aviation business, including taxi service and instruction.

PATTISON AIRCRAFT CORP., Eugene, Ore., capital stock $100,000, by George W. Pattison, Henry Ross and Winifred McPhee, to engage in general aircraft business.

FLORIDA AIRCRAFT CORP., Dunedin, Fla., capital, fifty shares no par value stock, by B. C. Skinner, president, B. W. Skinner, vice-president and C. W. Campbell, secretary, to manufacture airplanes and equipment.

AIR SERVICES INC., Waco, Tex., capital $125,000, to sell airplanes and operate an airport.

Two More Engines Approved

WASHINGTON (D. C.)—The Aeronautics Branch has awarded two more approved type certificates for engines. They are No. 40 Wright Gipsy L-320 4 cyl. in line inverted air cooled 90 hp at 1950 r.p.m.; No. 41 Aeromarine RAD-B, 9 cyl. radial air-cooled, 115 hp., at 1925 r.p.m.

Stout Offices in New Ford Plant

DETROIT (MICH.) — Stout Metal Plane Co., division of Ford Motor Co., has moved its offices into the new $475,000 addition to the airplane plant. The enlarged plant is now being fitted with the necessary equipment for resuming production on an enlarged scale.

Blair Replaces Emmons On Detroit Aircraft Board

DETROIT (MICH.) — Following a Board of Directors meeting on Jan. 17, Mr. E. S. Evans, president of the Detroit Aircraft Co., announced that Harold H. Emmons had resigned as chairman of the board to accept the position of Police Commissioner of Detroit. Frank W. Blair, chairman of the Board of Directors of the Union Trust Co., Detroit, has been named as Mr. Emmons' successor.

After a sales meeting held in the Detroit office of the Detroit Aircraft Corp. on Jan. 11, it was decided to divide the United States into sections. B. D. Adams will be the Acting General Sales Manager and will direct the activities of the department. John Nulsen, General Manager of the Ryan Division, will have charge of sales in the Central District for Ryan. Ray W. Brown will handle sales of Parks, Lockheed, Eastman, and gliders in the Central territory. Carl B. Squier, General Manager of the Lockheed Division, will be in charge of Lockheed sales in the Western district, and Ted Schlueter will be Western district sales manager for all other Detroit Aircraft products. C. R. Norton, Eastern Sales representative, will handle the sales of all products in the New York district, and L. J. Robinson will represent the sales organization in the Southeast.

N-B Firm Reports Assets and Liabilities

MARSHALL (MO.)—The Nicholas-Beazley Airplane Co. announces that the firm balance sheet, as of Nov. 30, 1929, covering eleven months of operation, reads as follows:

Cash, call loans, and accounts receivable	$138,588 72
Factory equipment and inventory	732,797 29
Total assets	$871,391 03
Current accounts payable	$30,442 49
Customers deposits	19,226 01
Total liabilities	$42,797 41

The above shows a healthy ratio of assets to liabilities of 20.5 to 1, and the value of 100,000 shares outstanding to be $8.29 each as against the par value of $5.00, according to a firm statement. It is estimated that the operations for the full year of 1929 will show a profit of $100,000 to $125,000 net, or $1.00 to $1.25 per share.

Award Aero Building Contract

FORT WORTH (TEX.)—It is expected that a sixteen-story aviation building to be erected here soon will be ready for occupancy by Sept. 1. This $600,000 structure will house the main offices of Southern Air Transport, Inc., and will be built by the Aviation Building Corp. The building will be of structural steel and light-face brick and four stores will be located on the first floor.

N.G.A. Clubs Now Total 32

DETROIT (MICH.)—New additions to the National Glider Association have increased the number of affiliated clubs from 29 to 32. The American Business Club, of Detroit, and clubs in Milwaukee and Akron are the latest to join. Some 50 new clubs, now in the process of organization in 24 different states, are expected to affiliate with the National group within the next two months.

Reorganize Board Of Stearman Aircraft

WICHITA (KAN.)—At a recent meeting of the board of the Stearman Aircraft Co., now a United Aircraft & Transport Corp. unit, the personnel of the board was materially changed.

Those who handed in their resignations were J. E. Schaefer, G. M. Brown, C. L. Henderson, J. O. Davidson, Ralph Middlekauf, George Siefkin, H. M. Steinbuchel, all of Wichita, and Robert E. Gross of the Viking Flying Boat Co., New Haven, Conn.

New Officers Installed

On Jan. 11 the following officers and directors were installed: president, Lloyd C. Stearman, vice-president and general manager, Walter P. Innes, Jr., vice-president in charge of engineering, Mac Short, and secretary, J. E. Schaefer. The new directors are: H. A. Dillon of the Wheeler Kelly Hagny Trust Co., Frederick B. Rentschler, president of United Aircraft and Transport Corp., and William E. Boeing, chairman of the board of directors of the U. A. & T. Mr. Rentschler will act as chairman of the Board. Mr. Schaefer will continue as sales manager, with L. M. Divinia acting as assistant sales manager in charge of service.

Dominion Clubs Seek Backing

WINNIPEG (MAN.)—Problems of the flying clubs in Canada will be discussed shortly with the branch of civil aviation, at Ottawa, in an effort to procure more financial support for the clubs from the Dominion government. Capt. J. A. Sully, R.F.C., president of the Flying Clubs' association, left here recently on an extended trip in Eastern Canada for the purpose of furthering the procedure of requesting the government's assistance and to visit other clubs. He will officially visit the flying clubs at Montreal, Ottawa, Toronto, Hamilton, London, St. Catherines and Windsor.

School Inspectors Meet

WASHINGTON (D. C.)—For the first time since the Department of Commerce school inspectors began their work in July, 1929, a conference of these men was held in this city Jan. 20-22, to discuss field problems and improved methods of inspection. According to Gilbert F. Bndwig, Director of Air Regulations, 30 schools have been approved.

Irvin Chute Royalty Granted to Van Meter

BUFFALO (N. Y.)—In giving his decision in the parachute apparatus patent case brought against the U. S. government by Solomon Lee Van Meter, who asked an accounting on parachute apparatus manufactured by the Irving Air Chute Co. for the government, U. S. Judge Hazel stated he believed a royalty of $12.50 on each unit of apparatus bought or used by the government to be fair and reasonable.

Between Jan. 1, 1919, and Aug. 15, 1925, the accounting period, 2,691 parachute packs were sold and delivered to the government, it was shown. This amount $46,137.50, Judge Hazel granted the plaintiff.

The action in which this opinion was given followed a decision by the court in an equity suit holding the Van Meter patent for parachute apparatus valid and infringed by the defendants. A trial by jury was waived, and the facts were stipulated upon which the liability of the government is based.

The opinion said that the Irving Air Chute Co., which manufactures the infringing parachute for the government, has taken a license from the plaintiff on payment of royalties and continues to produce parachutes in pursuance thereof.

The court in fixing the $12.50 royalty fee instead of the $25 fee asked by Van Meter said that the Van Meter parachute was crude and had never been used except in experiments wherein a weight was dropped from an airplane, while the device produced by the Irving Air Chute Co., and used by the government was on a higher state of perfection and considered safer and more serviceable.

Simmons Firm Men in Orient

LOS ANGELES (CALIF.)—Lawrence Beemer and James H. Baer, of the Simmons Aircraft Division, are now on a year's tour of the Orient, which will include Japan, China and the Philippines. The trip is being made for the purpose of closing several aircraft contracts now pending in those countries, and to pass decision concerning the inauguration of the network of airlines to connect the principle cities of the interior of China with the coast. For this latter purpose, they will be joined at Shanghai by the resident manager of the Simmons interests.

Pennsylvania Operators Band

PITTSBURGH (PA.) — The Pennsylvania Aircraft Operators' Association came into being at this city on Jan. 16. Members of this organization include practically all operators in the Pittsburgh district, and it is expected that the group will soon expand to state-wide size. The officers and directors are as follows: Bob Dake, president; John Douglas, vice-president; R. V. Trader, secretary and treasurer; R. W. Coates, D. Barr Peat and Jack Thompson, directors.

PERSONNEL

LIEUT HARVEY R. OGDEN has resigned from the army to become military liaison representative for Curtiss Aeroplane & Motor Co.

JOSEPH H. DOTTERWEICH, president of Aero Club of Buffalo, N Y, has been elected president of Buffalo Aviation Show, Inc.

ROGER Q. WILLIAMS is vice-president of Commercial Aircraft Co, Bridgeport, Conn, which will produce a five-passenger amphibion plane which he has designed JOSEPH CUBELLI is president of the company.

R Q Williams

H H. LIENAU and L. M. WINSTON, Redlands, Calif, GRAYSON B GRAHAM, Moorpark, Calif, FRANK E TYLER, DR HARRY ALLSHOUSE, JR, CHARLES M HOWELL and W J SQUIRE, all of Kansas City, Mo., have been added to the advisory board of Aircraft Finance Corp of America.

MILTON HAMON, manager of Curtiss-Wright Flying Service at Bridgeport, Conn, will manage a Curtiss-Wright airport in California. He is succeeded by SEABERY B. WARING

GEORGE C YUNKER, president of Yunker Aircraft Co, Wichita, Kan, is taking active charge of the company, having moved to Wichita from Dodge City.

EMORY B. BRONTE, manager of aviation department of Associated Oil Co, San Francisco, Calif, has been appointed a member of the aeronautical committee of the Central Coast Council of California State Chamber of Commerce.

J T HARTSON will direct the sales department of Comet Engine Corp, Madison, Wis, and cooperate with the research department of Air Investors, Inc, New York N Y, in assembling data on aircraft and engine manufacture and operations. Mr Hartson was recently sales manager of Wright Aeronautical Corp, Paterson, N J

J T Hartson

L. J SAUERBORN, Birmingham, Ala, has been appointed business manager of Davis Airlines, Inc, recently formed to operate an airline between Birmingham and Atlanta, Ga

EUGENE L. SMITH, recently general purchasing agent of Universal Aviation Corp, will direct the newly established aeronautical division of Frank G. Buffum Manufacturing Co, Louisiana, Mo, manufacturers of engine parts, hardware, and tools

HAROLD H EMMONS, chairman of the board of Detroit Aircraft Corp, has been appointed Police Commissioner of Detroit by Mayor Charles Bowles

MAJ JOHN C. BENNETT, manager of Curtiss Wright Flying Service at Nashville, Tenn, has been transferred to the same position at Louisville, Ky.

JAMES CLEVELAND N.A.T pilot between Chicago and New York, and CHARLES ASKEW, pilot on the Dallas-Kansas City run, have exchanged positions.

C. GILBERT PETERSON has been made sales engineer for the airplane division of Ford Motor Co.

LEWIS D PARKER has been made chief instructor at Skyways School, Marstons Mills, Mass

LESTER F. BISHOP has resigned from Thompson Aeronautical Corp. to accept an appointment as Department of Commerce inspector, and will be located at Kansas City, Kan.

H. J HOUGH has been made reserve pilot for Thompson Aeronautical Corp and is stationed at Kalamazoo, Mich

R W Fulton

R W. FULTON, recently director of sales for Colonial Flying Service, and formerly head of the aviation division of Tide Water Oil Company, has been made general sales manager of Consolidated Aircraft Corp, Buffalo, N. Y.

WALTER E HUTCHINGS has been appointed traffic representative for Colonial Flying Service at Rochester, N Y, succeeding SAMUEL DUNCAN, who has been transferred to Albany

J. KOLBENSCHLAG, chief pilot of Sidles Airways, Inc, Lincoln, Neb., has resigned to become manager of Great Plains Aircraft Co. Hastings, Neb.

MAJ ROBERT G. ERVIN, New England manager for Curtiss-Wright Corp., has resigned

THEODORE S LUNDGREN has been appointed director of sales and advertising for Emsco Aircraft Corp, Downey Calif.

ALBERT S HACKETT has been re-elected president of New Orleans Airport Commission. Other officers were also re-elected.

HAROLD W. BOOTH has been appointed sales manager of American Aeronautical Corp, New York, N. Y.

CAPT. THOMAS CARROLL has been elected vice-president of Washington (D C.) Air Terminals Inc., and will be in charge of important improvements now being made at Washington Airport

Schools and Colleges

PARKS AIR COLLEGE, East St Louis, Ill, has purchased a tri-engined all metal transport plane, a Ford 5-AT, for use in the training of students to become pilots of large, passenger craft

CURTISS-WRIGHT FLYING SERVICE, New York City, is opening three new classes this month in its ground school at New York University, 51 West 4th St

CURTISS-WRIGHT FLYING SERVICE, Denver, Colo, has enrolled sixty students in the three months' course it is offering The course is to consist of lectures, laboratory and shop work

CURTISS-WRIGHT FLYING SERVICE, Springfield, Mass., has opened a ground school with 28 students in attendance

SKYWAYS, INC, has started a new forty-weeks ground course to meet three nights a week at the Boston Airport. Professor Hilding Carlson is the instructor This school is also offering a course in flying which may be paid for on the instalment plan With two indorsers a student may take the course for a private license, which costs $540, by paying $12 weekly into a local bank The student is insured for $2,500, thus relieving the indorsers from any liability in case of death or injury to the student

SPARTAN SCHOOL OF AERONAUTICS, Tulsa, Okla, has added an advanced transport course to its curriculum to be given in cooperation with the Southwest Air Fast Express Air Lines. R W Cantwell, chief pilot, and Lawrence Fritz, general manager of S.A.F.E, are the instructors

LATHROP TRADE SCHOOL, operated by the public school system of Kansas City, Mo., is to have a class in aviation The Navy and War departments will supply without cost equipment that is being retired from use on their own fields

ANCON AVIATION SCHOOL, Portland, Ore., reports that eight Chinese students, the first of a group of fifty expected in 1930, have enrolled for a year's training They were selected by competitive examination held in San Francisco and will be supported during their stay by the Chinese government

CURTISS-WRIGHT FLYING SERVICE plans shortly to establish a training school at Lakeland Fla, for about six weeks as an experiment If school proves satisfactory, it will be made permanent.

UNIVERSITY OF SOUTHERN CALIFORNIA has opened a course in aircraft engines as one of its evening classes

YOUNGSTOWN AIR COLLEGE, Youngstown, Ohio, has opened a downtown office and school at 104 West Wood Street Courses are offered in technical and mechanical subjects Work has been started on preparing a flying field for student use.

OHIO STATE UNIVERSITY, Columbus, Ohio, is offering three courses in aeronautical engineering in connection with its work in mechanical engineering Asst Professors Karl W. Stinson and Andrew J. Fairbanks will teach the courses, to which it is hoped soon to add laboratory work

BRIEFLY

Award of the 1930 National Air Races to Chicago, and decision of the contest committee to hold them early in September, has been officially announced by Senator Hiram Bingham, president of the N.A.A.

Lieut.-Col Vejyant Rangsrisht, assistant Chief of the Royal Air Service of Siam, was in Kansas City recently, in the course of an inspection tour of the United States to study commercial aviation. His itinerary may be obtained through the Siamese Embassy at Washington.

Curtiss-Wright Flying Service of Los Angeles has begun publication of a bi-weekly paper called *The Fledgling*

Two officers each from the Infantry, Field Artillery, Cavalry and Coast Artillery, as well as one officer each from the Signal Corps and Corps of Engineers, have been assigned to the Air Corps Tactical School, Langley Field, Va., as students for 1930-31.

Governor Walter J. Kohler of Wisconsin covered more than 10 000 mi in his private Ryan brougham during 1929

Officials of Reid, Murdoch & Co, Chicago, use a tri-engined Ford plane with a shelved interior carrying representative samples of the firm's stock of grocery goods

Cree & Hoover Drilling Co, Amarillo, Tex, has just taken delivery of a Wasp-powered Ryan brougham for use in the oil fields

Southern California Chapter of N.A.A. has begun publication of a monthly paper known as *The Aileron*

Russell Manufacturing Co, makers of Rusco brake lining, etc., is holding a series of salesmen's conferences at branch offices throughout the country

W H Bowlus, president of Bowlus Sailplane Co, San Diego, Calif, is planning to open a gliding school there

Boston Flying Club is the name adopted by members of what was formerly Curtiss-Wright Flying Club of Boston. Funds are being accumulated for the purchase of a plane

Fred Moller, Fairbanks, Alaska prospector, made an extensive trip into the almost inaccessible northeast section of the territory in a Waco Nine, staying two months and flying at temperatures as low as 27 deg. below zero, according to word recently received.

Curtiss-Wright Flying Service has established an employment bureau for the benefit of graduates of Curtiss-Wright schools all over the country, with headquarters at 27 West 57th Street, New York City. Bulletins listing graduates who wish positions in commercial aviation will be sent regularly to all executives of the Curtiss-Wright Corp.

When the Eastman Flying Boat, product of Detroit Aircraft Corp, was ready for Department of Commerce tests, the Detroit River was frozen, so the craft took off from the ice, and landed later in the snow at Grosse Ile Airport.

Lieut Apollo Soucek has completed a new breathing apparatus, and will soon make another attempt to regain the world's altitude record, using the Wright Apache in which he made a record last May

Balanced ailerons and rounded wing tips are among the features of the new model Pitcairn Mailwing, using Wright J-6 225 hp. engine.

Akron Chamber of Commerce is planning to hold a glider rally in that city soon with Dr. Wolfgang Klemperer, now with Goodyear-Zeppelin Co, as presiding officer and guest of honor Akron Glider Club is now affiliated with National Glider Association

Bethlehem Aircraft Show will be held at Bethlehem (Pa.) Municipal Airport Feb 22-March 1.

Winnipeg (Man) Flying Club reports that its members put in 1,460 hr of flying during 1929, an increase of 45 per cent over the previous year. There were 1,419 passengers carried and a total of 9,126 flights recorded

"Women's Wing and Prop Club" is the new name adopted by the women pilots' club of New England at a recent meeting in Boston

Curtiss-Wright Sales Corp has stocked a number of model planes for sale at Boston Municipal Airport.

S.A.F.E. has purchased six additional Ford planes, bringing the total number of planes operated by the company to sixteen.

AERONAUTICAL CALENDAR

Feb. 5-12	New York Aviation Show, auspices Aviators' Post American Legion
Feb 8-15	Cincinnati Ohio Aircraft Exposition
Feb. 15-23	International Aircraft Exposition, St. Louis Mo
Feb 20	Meeting of Committee on Airport Management Standards and Ethics Hotel Jefferson St Louis Mo
Feb. 20-22	Second Annual Aviators Reunion Aviation Post No 631, American Legion Chicago Illinois
Mar 8-15	Second Annual Pittsburgh Aircraft Show Motor Square Garden Brownsville Pittsburgh, Pa Shaw Director Ray Krimm, Pittsburgh, William Penn Hotel
Mar 17	Regional Airport Conference for New England, Providence, R I
Mar 22-29	Second Annual Aviation Exposition, Buffalo N Y
Mar 22-30	Camden N J Aircraft Show Convention Hall Camden N J L D Odhner, executive secretary Hotel Walt Whitman Annex.
Mar 26-Apr 1	Cincinnati, Ohio, Aircraft Show.
April 5-13	All American Aircraft Show, Detroit
May 3-10	New York Aircraft Salon auspices Metropolitan New York Division Distributor-Dealers Section, Aeronautical Chamber of Commerce, at Madison Square Garden, New York City
May 14-16	National Conference Airport Section, Aeronautical Chamber of Commerce, Buffalo N Y
June 28	Annual R.A.F. Display, Hendon Eng.

TRADE TIPS

It has been reported that

City Council of Youngstown, Ohio, has voted to lease Lansdowne Field, to be known hereafter as Youngstown Municipal Airport, to the highest bidder

A fund is being raised to cover lighting of the Daytona (Fla) airport, and municipal authorities expect to be in the market for equipment soon

About $60,000 will be spent for hangars and lighting equipment for Texarkana (Tex.) airport.

R. W. Rounseville will receive bids for erection of a hangar 60x100 ft. at Kewanee (Ill) airport.

Sheridan, Wyo., will improve a 200-acre tract as an airport

Philip Ball, owner of the St. Louis Browns, is considering plans for construction of a 160-acre flying field at Battle Lake, Fergus Falls, Minn

Charles Dornberger, Arlington Hotel, Hot Springs National Park, Ark., director of Victor recording orchestra using his name, would like to arrange with manufacturer for use of an open cockpit plane in return for promotion work incidental to the travelling of the orchestra He holds a private pilot's license

George Dempster, city manager of Knoxville, Tenn., is having plans prepared for construction of a $25,000 hangar at McGhee Tyson Airport.

B. Whittle, Sullivan Aircraft Manufacturing Co., Wichita, Kan., is negotiating for a plant site at Shreveport, La.

Dwight Randall, city clerk of Blackwell, Okla, will receive bids for construction of a hangar to cost about $25,000 at an airport which is to be developed by the city.

Plans for a $225,000 administration building at Wichita Municipal Airport have been prepared, and bids for construction will be received.

Additions to three hangars costing about $35,000 are planned for San Francisco Municipal Airport

John N. Eddy, city engineer of Berkely, Calif, will receive bids for leveling the municipal airport and construction of two runways.

United Airport, Burbank, Calif, is preparing to install lighting equipment within the next sixty days.

The Los Angeles Harbor Commission is considering improvements for Allen Field, Terminal Island, Los Angeles harbor, including new hangars, administration building, lighting, runway surfacing and grading, seaplane ramps and handling equipment, and some dredging and filling in connection with runway extensions.

Correction: Newark, N. J., was unfortunately substituted for Newark, N. Y., in an item which appeared last week The item should read: A committee has been appointed by Mayor Frank Baltzel, of Newark N Y, to consider leasing the municipal airport to private interests

AIRPORTS AND AIRLINES

Brown Outlines Air Mail Pay Plan

Would Have Sliding Scale Based on Mileage

WASHINGTON (D. C.)—The Post Office Department's policy with reference to the readjustment of the rates of pay for carriage of air mail was announced by Postmaster General Walter F. Brown on Jan. 14, in an address before the Cleveland Chamber of Commerce. Declaring that the system of paying by the pound, regardless of distance traveled, is manifestly unsound, the Postmaster General recommended that the present law should be amended so as to authorize him to contract for transportation of mail between such points as he may designate at fixed rates per mile for definite weight spaces, the base rate not to exceed $1 per mile for 1,500 lb. of mail capacity. Under such an authorization, he explained, a schedule of compensation could be set up providing for the payment of $.30 per mile for a weight space of 100 lb., with increased compensation per mile for increasing weight spaces, until the maximum of $1 per mile for 1,500 lb. of weight space is reached. It is probable, he said, that to the base rates per mile a proper factor should be added for night flying and for flying over mountains or territory frequently covered by fog.

Would Use Passenger Trips

"This innovation would greatly increase the air mail service to the public by permitting dispatch of air mail on regularly scheduled passenger flights," said the Postmaster General. "At the same time, it would enable the Post Office Department to give immediate assistance to air passenger carriers on such routes as were deemed essential by paying for carrying the mails a substantial sum, based upon a definite weight space preempted. For example, the operator of a passenger plane on a route 200 mi. long, assuming space for 100 lb. for mail, should be contracted at $.30 per mile would receive from the government 200 times $.30 or $60 for each flight. Greater weight spaces, of course, would be required on the regular mail routes and the rate per mile would be correspondingly increased. Various factors, of course, should determine the amount of weight space to be taken, namely, the character and frequency of the service, the volume of mail flowing and the financial necessities of the carrier."

Mr. Brown also proposed that the Postmaster General should be authorized to negotiate with present air mail contractors to extend contracts to a maximum period of ten years from the date of the original award at a compensation not in excess of the legal maximum. He declared that with the passenger lines, as with the exclusively mail lines, preference in the awarding of contracts should be given, if possible, to pioneers in the air transport industry of good character and financial responsibility.

Stating that the contribution now made by the government for civil aeronautics aggregates more than $30,000,000 a year, including compensation paid to mail contractors, weather service, lighting airways, providing emergency landing fields and supervising commercial flying, Mr. Brown expressed

(Concluded on page 179)

Work on National Port Meeting

BUFFALO (N. Y.)—Representatives of aircraft manufacturers and commercial transport companies operating in the Buffalo area will attend a special meeting soon to arrange details for the national convention of the airports division of the Aeronautical Chamber of Commerce which will be held here May 14-16. Airport management, maintenance and operation will be the major theme for discussion.

The Aviation Corp. And Stout Report Year

NEW YORK (N. Y.)—Planes of The Aviation Corp. system, which includes Universal Aviation Corp., Southern Air Transport, Embry-Riddle Aviation Corp., Colonial Airways Corp. and Interstate Airline, were flown 5,657,929 mi. in scheduled operation during 1929. This mileage included air mail, passenger and express services. A total of 3,332,708 mi. was flown over eleven contract air mail routes while the passenger planes were flown 2,301,221 mi. and carried 20,659 passengers. This report does not cover operations of taxi, sight-seeing service and flying schools.

Stanley E. Knauss, vice-president and general manager of the Stout Air Lines, has reported that the company's planes carried 5,687 passengers a distance of 136,0f6 mi. in 1929 on the Detroit-Cleveland division and 3,954 passengers a distance of 197,453 mi. on the Detroit-Chicago division. There were 2,054 trips scheduled over the entire Chicago-Detroit-Cleveland service during the year and 1,813—88 per cent—were completed. During the year the staff of transport pilots was increased from five to nine, seven flight escorts were added to the service and uniforms were adopted for both pilots and escorts.

New Air Mail Estimates Reported by Committee

WASHINGTON (D. C.)—The Committee on Appropriations has reported to the House of Representatives on the matter of appropriations for the Post Office Department's air mail program for the fiscal year ending June 30, 1931.

The current appropriation for transportation of foreign mail by plane is increased in this report from $4,300,000 to $5,f00,000. This additional fund of $800,000 is provided for the purpose of increasing frequency of air mail trips on routes already in operation but on which it has not been possible to maintain the number of trips per week stipulated in the contract between the government and the company involved. Lack of sufficient money was explained by Assistant Postmaster General Glover at the hearing on this subject to be responsible for the low frequencies. It was pointed out that because fewer trips were being made than desired the value of the line was to some extent abrogated.

Routes coming under this classification are: Miami-Cristobal—now operated three times a week with daily service authorized by the contract. San Juan-Port of Spain, Cristobal-Santiago, Santiago-Buenos Aires, Buenos Aires-Montevideo—now operated once a week with thrice weekly service authorized by contract. Three-trips-a-week service is authorized between Cristobal and Paramaribo but none is in operation at present. This sum will not permit additional service on all these routes of course. A supplementary estimate of $1,500,000 may be available later for the installation of the proposed route between Paramaribo and Buenos Aires down the east coast of South America.

The report included an increase in the appropriation for domestic air mail from $13,300,000 to $15,000,000. It was stated at the hearing that the Post Office Department paid $11,169,015.13 to the domestic air mail contractors for the fiscal year 1929 and the postal revenue was only $4,458,661.02, a difference of $6,710,354.11. It is expected that with this increased appropriation, supplemented by the savings from rearranged routes and revised contracts now under consideration (estimated at about $3,000,000), sufficient leeway will be provided for extensions and additions to the domestic system.

Testing Adams Pickup Further

YOUNGSTOWN (OHIO)—The Adams air mail pickup device, which is being constructed by the Truscon Steel Co. here was to be demonstrated to government officials at Washington this week.

Announce List Of Airports of Entry

WASHINGTON (A. C.)—Recently new airports of entry were announced by the Treasury Department. [See Jan. 11 issue of AVIATION.] The following is a list of all the permanent and temporary airports of entry as authorized by the Treasury Department at the present time. (Two have been abolished, namely, Bryn Mawr Field at Seattle and the blanket arrangement covering the entire customs district of Los Angeles.)

Permanent Airports of Entry

Place	Name of Air Field	Date Designated
Key West	Meacham Field	Dec. 20 1927
St. Paul	Municipal Airport	June 4 1928
San Juan, P. R.	Escambron Field	Aug. 9 1928
Seattle	Boeing Municipal Field	Sept. 11 1928
Albany	Municipal Field	Sept. 28, 1928
Miami	Pan American Field (at 36th Street)	Oct. 16, 1928
Seattle	Lake Union	Dec. 27 1928
San Diego	Ryan Flying Field	Dec. 27, 1928
Newark	Metropolitan Airport	Jan. 2, 1929
Buffalo	Municipal Airport	June 10 1929
Detroit	Grosse Isle Airport	July 31 1929
Ajo, Ariz.	Municipal Airport	Nov. 15 1929
Brownsville	Municipal Airport	Jan. 8 1930

Temporary Airports of Entry

San Juan	Isla Grande	Jan.	19 1929
Akron	Municipal Airport	April	8 1929
Nogales, Ariz.	Municipal Airport	June	27 1929
Detroit	Ford Airport	Aug.	1 1929
Derby, Vt.	Canadian Gateway Airport	Aug.	1 1929
El Paso	Municipal Airport	Aug.	15, 1929
Glendale	Grand Cent. Air Term.	Nov.	12, 1929
Palm Beach	Curtiss Flying Base	Dec.	2, 1929
Pembina, N. D.	Municipal Airport	Jan.	8, 1930
Portal, N. D.	Portal N. D.	Jan.	8, 1930
Douglas, Ariz.	Douglas Internat. Airport	Jan.	8, 1930
Port Angeles, Wash.	Port Angeles Airport	Jan.	8, 1930
Alhambra (Los Angeles)	Western Air Exp. Term.	Jan.	8, 1930

Start Albany-Cleveland Night Mail

ALBANY (N. Y.)—Night air mail service between this city and Cleveland will be inaugurated Monday, Jan. 27, by Colonial Western Airways since beacons are now in operation over this route. Schedules will be changed.

Midcontinent Shortens Line

WICHITA (KAN.)—Midcontinent Air Express, which is affiliated with Western Air Express, will operate between here and Denver, Colo., instead of from Denver to Kansas City, via Wichita. Wichita becomes a terminal point for the line. The change was made because Midcontinent practically duplicated W. A. E. service between here and Kansas City.

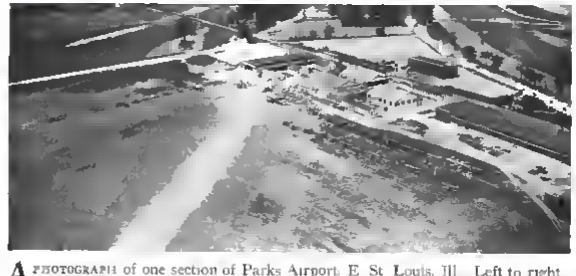
Aero Branch Forms Committee on Radio

WASHINGTON (D. C.)—In an effort to coordinate various governmental and industrial research programs on aeronautical radio problems and to focus these programs on the salient problems, the Department of Commerce has organized what is called the Liaison Committee on Aeronautic Radio Research, under the chairmanship of Harry H. Blee, director of aeronautical development in the aeronautics branch. This committee will make an initial survey of the research programs now in progress and probably shall continue to meet three or four times a year thereafter to keep in touch with progress along that line.

Serving with Mr. Blee on this committee are the following men, representing the various organizations mentioned.

Dr. J. H. Dellinger (secretary of the committee), Bureau of Standards; Lt. Comdr. D. B. Duncan, Bureau of Aeronautics, Navy Department; F. C. Hingsburg, Airways Division, Bureau of Lighthouses; (H. J. Walls, alternate), Herbert Hoover, Jr., Aeronautical Chamber of Commerce; (H. C. Leuteritz, alternate); Dr. Lewis M. Hull, Radio Manufacturers Association; George W. Lewis, National Advisory Committee for Aeronautics; Capt. H. M. McClelland, Air Corps; F. M. Ryan, Institute of Radio Engineers; Wesley L. Smith, American Air Transport Association; Ray Stearns, National Electrical Manufacturers Association.

Recent Photo of Parks Airport Buildings



A PHOTOGRAPH of one section of Parks Airport, E. St. Louis, Ill. Left to right the buildings are: Mechanics School, classrooms (two white buildings), restaurant, hangars, hangar (large metal building), student recreation quarters (long white building), Parks aircraft factory (long brick building at right).

Aviation Corp., W.A.E. Announce Cuts in Fares

NEW YORK (N. Y.)—Both The Aviation Corp. and Western Air Express have announced fare reductions, the former became effective Jan. 22 and the latter Jan. 15. This rate cut was the second within 30 days for W. A. E.

Universal, Southern Air Transport, Embry-Riddle and Colonial are included in the new Aviation Corp. rate schedule. Universal's air mail service between this city and Los Angeles will cost $156.05 instead of $223.51. The fare for the plane trip between Cleveland and Garden City, Kan., without the rail connections on either end will be $59.79 instead of $127.25. [See AVIATION for Jan. 11 and 18 for reductions by other lines.]

The revised rate schedules on the corporation's various lines follow:

	New Air Rate	Old Air Rate
Universal Air Lines		
Cleveland to Chicago	$17 60	$37 50
Chicago to St. Louis	14 74	30 00
Chicago to Kansas City	23 60	45 75
Kansas City to Garden City	18 39	44 00
Kansas City to Wichita	9 57	12 50
Kansas City to Tulsa	12 50	30 06
Tulsa to Dallas	10 50	25 00
Southern Air Transport		
Dallas to El Paso	31 90	57 90
Dallas to Houston	13 70	23 30
Dallas to San Antonio	14 03	25 50
San Antonio to Brownsville	14 41	26 20
Embry-Riddle		
Chicago to Cincinnati	14 85	27 00
Colonial Air Transport		
New York to Boston	17 43	27 88

The rates were reduced by W. A. E. to $120 from Los Angeles to Kansas City and to $127 from Kansas City to San Francisco. The $21.50 excursion rate from Los Angeles to San Francisco will remain in effect, and the $10 fare to Catalina Island is reduced to $7.50. Lower rates to other points from Los Angeles will be as follows: Kingman, Ariz., $24; Holbrook, Ariz., $45; Albuquerque, N. M., $62; Amarillo, Tex., $83; Wichita, Kan., $107. These new rates will remain in force for 60 days, at the end of which time they may be made permanent.

Road Builders Discuss Airports

ATLANTIC CITY (N. J.)—Their relation to airport construction problems in this country was discussed by delegates to the American Road Builders' Association annual convention during the Jan. 14 session. These discussions were an outgrowth of the National Airport Conference held in Washington Oct. 24-25, under the auspices of the city officials division of the association. A report on the entire airport construction field, promised at the Washington conference, was announced here to have been completed and made available for free distribution upon request, from the Association headquarters at the National Press Building, Washington, D. C. The report is compiled in pamphlet form and covers a wide range of subjects bearing on airport construction, including layout and planning, structures, drainage, surfaces, management, lighting, housing, and public accommodation.

AIRPORT CONSTRUCTION PROJECTS

West

Los Angeles harbor department is planning to install improvements at Allen Field, located on Terminal Island in the Los Angeles harbor This action will be taken, it is understood, when and if Allen Field is named the port of entry for the Los Angeles district. Allen field now consists of a single east-west runway and of pier and ramp accommodations for seaplanes. Improvements would include the provision of additional runways, and hangar facilities, as well as complete lighting for night operations

Improvements recently completed at Murphy Airport, Los Angeles headquarters for the Walter M. Murphy Aircraft Co., southern California distributors of Curtiss Wright products, include the construction of a new north-south runway 3 000 ft long and the addition of two hangars, giving the field a total of five hangars in use with a sixth now under construction Pilots quarters also have been provided.

Crescent Airways, Los Angeles, has applied for a building permit for construction of 70x80 ft hangar at 9105 S. Western Avenue

Preliminary plans have been prepared for a hangar to be erected at the Fresno Municipal Airport, for the Cardiff & Peacock Aviation School of Bakersfield It will be of structural steel and corrugated iron, measuring 60x100 ft and costing about $12,000

E L. Norberg, architect 580 Market Street, San Francisco, Calif., is preparing plans for $300 000 exhibition building, to be constructed at Alameda Airport

John J Sheedy, Cheyenne, Wyo., was the low bidder for installing beacons on the mail route between Spokane and Pasco

Western Air Express has taken out a permit for erection of $10,000 airport utility building, 50x50 ft, on Valley Boulevard, between Almansor and New Streets, Los Angeles

North

According to Emil S. Gustafson, Duluth city commissioner, a bond issue will be floated during the early spring to finance a five-year development program for the Williamson-Johnson Municipal Airport The plans submitted by the Leonard Macomber, Inc., Chicago, were considered too elaborate for the expected requirements so bids will be called for other plans from engineering firms that will be more suitable for development The city expended nearly $100 000 during 1929 on the airport, which included the construction of two 2 650 ft. runways 500 ft wide Top surfacing is to be completed in the spring and the necessary buildings are to be erected.

According to a bulletin recently issued by Jerome C Dretzka secretary of the Milwaukee County Park Commission, which lost control of the Milwaukee Airport on Jan 1, the 1930 budget adopted by the board of airport improvements provides $265,415 05, of which $250,029 05 will be spent for buildings and improvements such as surface drainage, runways, covering main drainage ditch, buildings and general field work A total of 1,397 planes arrived at the airport during 1929 and 1,416 departed The number of arriving passengers totaled 1,754 and departing 1,733

The Duluth city council has leased the Duluth Boat Club property on Minnesota Point and will develop it into a seaplane base. Arrowhead International Airways, which has stressed the value of this site since its location there, will use it as the base of operations for sea planes in the spring

L W Baumeister & Son, St Paul, has been awarded the contract for an $85 000 hangar at the municipal airport, to be 115x200 ft. and of cantilever construction

Lights are to be installed soon at the city airport of Butte, Mont James H Rowe is chairman of the airport commission

Bur-Hi Aircraft Corp, Middleton, Wis., is reported to be planning erection of a 40x120 ft addition to its factory

East

The municipal airport of Baltimore is nearing completion. Already about 50 acres inside the fill are level with the water line and it is expected that grass will be growing on the fill next summer. Ninety per cent of the piling has been completed and 4,000 000 of the 12,000 000 cu yds of earth necessary has been pumped behind the bulkhead This is going on at the rate of 500 000 cu.yds of material per month The cost of the material and pumping is $.04 per cu.yd instead of the expected $.10 per cu yd

Central

D T Stevens, assistant radio engineer of the Aeronautics Branch, has announced that work on the Wichita radio range beacon will begin as soon as weather permits The beacon is to be installed south of the airway communication station already in service here and will be located about 1 mi. north of the municipal airport where the four 55-ft and one 60-ft towers will not menace fliers It is believed the station will be finished by July 1. A similar station is to be located at Kansas City, Mo, immediately

Centerville, Ia, at a special election Jan 15 authorized the city council to purchase and maintain a municipal airport—the second municipality of the state to take advantage of the authority granted it under recent state legislation

Preliminary plans are in progress for construction of an airport at Joplin Mo M. E. Jones is city clerk, and S P Ashcraft, Jr., is city engineer

Tulsa, Okla will soon begin the construction of $50,000 hangar at Everett Taylor Airport

Lincoln Airways, 2415 O Street, Lincoln, Neb, has let the contract for erection of an 80x100 ft stuccoed concrete block hangar at the municipal airport, northwest of the city, and work is under way

Effingham (Ill.) business men have taken option upon a 160 acre tract of land adjacent to the city and plans are under way for establishment and development of an airport there

The new approach to Lambert-St. Louis field, which will be hard surfaced with cinders and will shorten the distance to the field by at least a mile, has been started by the city

Indianapolis has let the contract for erection of two story and basement administration building, 131x148 ft, and hangar

South

Construction projects at the Tyler (Tex.) Municipal Airport, which include an 80x100 ft. hangar, a lean-to housing offices, waiting rooms, rest rooms and shops, and the grading of the eight way landing field will be completed by Feb. 1, Airport Manager O C. Palmer reports As soon as the field is completed, activities of the Tyler Aviation Service, of which Mr Palmer is head, will be resumed The formal opening and dedication of the airport will take place late in the spring

Bates Field, Mobile, Ala, one of the first of the larger municipal airports in the state, will be enlarged and improved if present plans of the city officials are carried through An additional plot of land adjoining the airport and belonging to the city will be levelled and filled in Approximately $22,000 will be spent for this work

Work has been started on the Greenville (Ala.) Municipal Airport, which follows a strenuous municipal campaign for a port The field is located 3 mi east of the city

A 3,000,000 cp Sperry revolving beacon has just been installed at the Jacksonville Municipal Airport. The light has been placed upon a 52-ft. steel tower

Installation of lights at Menefee Field, New Orleans, La, at a cost of about $25 000 is reported to have been arranged

Expenditure of approximately $75 000 for improvements at the Curtiss Wright Flying Service Palm Beach base has been approved by officers of the line

Blair & Co, is developing the Grand Central Airport of Florida, near St. Petersburg, Fla, with four runways, 80 x 120 ft hangar, etc

Improvement now under way at Sweetwater (Tex.) Municipal Airport includes installation of complete night lighting equipment and grading of the field.

The city of Breckenridge, Tex will take over the independently owned airport near that city for the development of a city project

Boundary, beacon, and flood lights of the Tampa Municipal Airport were switched on for the first time Jan 18

Lake Worth, Fla will soon have an airport for the accommodation of land and seaplanes

Brown Outlines Mail

(Continued from page 178)

the opinion that to extend the aid of the Post Office Department, the Department of Agriculture, and the Department of Commerce to air mail and passenger lines covering the entire map of the United States would create an unjustifiable tax burden

"For the present it would seem sufficient," he said, "for the federal government to concentrate its exceptional aid on essential air transportation routes. . . . The several states should be willing to share with the federal government the burden of providing and maintaining airways My own experience in the air convinces me that adequate emergency landing fields, lights, radio, reliable weather information, together with modern planes and expert pilots, all under government inspection and supervision, will make flying as safe as any other means of rapid transit."

This system of payment suggested by the Postmaster General is fundamentally akin to that laid down by the Interstate Commerce Commission for the compensation of railroads carrying mail The great advantage to the contractor lies in the Government's intention of compensating him for weight space contracted for regardless of actual poundage carried; thus a lower rate of compensation may be accepted by the contractor without suffering a loss, due to the assured income guaranteed. Should the Postmaster General's suggestion be acted upon, an emergency rate would probably be provided, as is the case with the railroads, for mail transferred from planes having a certain unit compensation to those having a differing rate No move toward instituting the necessary legislation for carrying out his suggestions will be made by the Postmaster General until he has received the reaction of the industry to them

Data Requested By Aero Branch

WASHINGTON (D C.) — The Aeronautics Branch has requested that all airport managers in this country send their name and address to the Airways Bulletin Section here in order to complete the Department of Commerce files It has been requested, also, that the opening or completion of new airports and landing fields be reported as early as possible. Following receipt of such notification forms will be supplied for the preparation of Airways Bulletin data. Changes in airports involving revision of the Bulletins already issued should be reported as early as possible, also

Santa Barbara to be on Airline

SANTA BARBARA (CALIF)—This city will be made a regular port of call on the T A T-Maddux coastal route between Los Angeles and San Francisco within the next 60 days, according to Jack Maddux The Casa Loma field north of town, owned by Earle Ovington, pioneer pilot, will be made the base for local operations In order to protect property owners in the vicinity of the field, which is within the Santa Barbara city limits approximately three miles from the center of town and in the heart of an exclusive residential section, no miscellaneous flying will be permitted in the future and a sign will be erected over the hangars, warning non-transport planes away

Air Mail Statistical Report for November, 1929

Route Number and Terminal	Length of Route (Miles)	Frequency (Round Trips per Month Scheduled)	Miles of Service—Scheduled	Miles of Service—Actually Flown	Total Weight of Mails Dispatched (Pounds)	Amount Paid to Contractor
1 Boston-New York	192	25	11 236	16,244	10,814	$30 042 75
2. Chicago-St. Louis	278	60	35 360	31 651	5 104	12 920 05
3. Chicago-Dallas	1,039	60	121,797	108 421	36 181	108 543 00
4 Salt Lake City-Los Angeles	600	56	62,600	66,606	65 821	192 463 37
5. Salt Lake City Pasco	530	60	64,130	63 520	23 571	70 713 94
8. Seattle-Los Angeles (a)	1,141	30	63,954	63 216	28 653	58,576 74
9 Chicago-Minneapolis	503	96	72,923	67 408	16 463	45 262 44
11 Cleveland-Pittsburgh	123	60	15 375	12 705	10 156	30 467 44
12. Cheyenne-Pueblo	199	30	12,527	11 214	7,159	5 942 07
16 Cleveland Louisville	345	45	31,794	23,637	5 929	7 232 92
17 New York-Chicago	710	60	168 460	96 040	147 549	115 147 07
18 Chicago-San Francisco	1,932	56	231 368	227 205	152 285	313 392 31
19 New York Atlanta	763	30	56,010	45 479	32 082	96 247 50
20 Albany-Cleveland	446	26	32 396	29,389	7 363	6,172 72
21 Dallas-Galveston	320	30	19 826	18 962	3 092	6,936 78
22 Dallas-Brownsville	529	30	32 599	31 238	7 034	20 327 36
23 Atlanta New Orleans	483	30	29 112	25,014	7 357	12 875 08
24 Chicago-Cincinnati	278	98	49 308	41 418	6,815	10 617 96
25 Atlanta Miami	736	30	45 358	43,586	10 893	15 964 24
26. Great Falls Salt Lake City	489	30	36 160	38,160	5 003	12 381 65
27 Bay City Chicago	773	25	43 990	36,185	14,195	12 632 05
28 St Louis-Omaha	464	60	49 617	45 487	13 040	10 192 68
29. New Orleans-Houston	319	30	19 140	18 988	3 569	3,569 44
30 Chicago-Atlanta	768	30	46 080	39 819	6 845	5 339 15
32. Pasco-Seattle	449	30	32,280	26,871	12,579	1,132 11
Totals	14 369	1,103	1 336 348	1 222,201	624,750	$1,213 433 62

(a) Southbound trip not operated between Seattle and Portland. Supplemental payment—Route 17, October, 1,240 lb 12 oz., $923 12.

[NOTE—Close comparisons between the various air mail reports issued from time to time will reveal slight discrepancies in various figures. These are not errors, strictly speaking but are due to various readjustments which have to be made from month to month after the preliminary figures have been released.—Editor.]

Bad Weather Cuts Air Mail Poundage

WASHINGTON (D C) — Air mail traffic in December dropped 4,352 lb. from the November figure, the Post Office Department reports, a total of only 618,809 lb being carried during the last month This decided decrease was caused by the worst flying weather in the history of the air mail service, which practically paralyzed operations in almost every section of the country. Dense fog and low atmospheric pressure prevailed for days during what should have been the busiest season of the mail carriers However, in spite of the weather handicap the poundage for this December was greater than that for December, 1928, which was 541 561 lb The preliminary figures for the poundage by routes are as follows

	Mi.	Oct.	Nov	Dec
Boston-New York	192	10 765	16 166	9 288
Chicago-St Louis	278	6 041	5 104	3 455
Chicago-Dallas	1,039	39 012	36 286	27 458
Salt Lake-Los Ang	690	73 466	65 821	84 442
Salt Lake-Pasco	530	26 162	23 571	25 445
Seattle-Los Ang	1,141	23 851	20 936	23 526
Chicago-Minn.	503	19 110	16 467	15 042
Cleveland-Pitts	123	7 054	10 155	9 074
Cheyenne-Pueblo	199	8,934	7 166	8,455
Clevel Louisville	345	8,689	5 936	4 045
New York-Chicago	710	157 825	142,359	113 558
Chicago-San Fran	1,932	178 984	150 550	173 945
New York Atlanta	763	31 584	30,264	28,151
Albany-Cleveland	446	12,402	7 458	6,628
Dallas-Galveston	320	3 657	3 165	3,323
Dallas-Brownsville	529	7 178	7,101	7,766
Atlanta-New Orl	483	8,076	7 386	6 554
Chicago-Cincinnati	278	6 004	6 824	[illegible]
Atlanta-Miami	736	10 992	10 893	13 181
Great Falls-Salt L	489	6 812	5 003	5 993
Chicago-Bay City	712	15 748	14 565	6,987
St. Louis-Omaha	463	13 785	13,042	13,308
New Orl-Houston	319	4 095	3 569	4 083
Chicago-Atlanta	768	8 582	6,853	7 639
Pasco-Seattle	449	18 787	12,532	12,134
Total		701,625	623,161	618,809

Decrease—4 352 lb.
Daily average—24 752 lb for December

Lambert-St. Louis Plan Offered

ST LOUIS (MO)—A comprehensive plan for development of Lambert-St Louis Field, this city's municipal airport, entailing total expenditures of $1,138,500, has been submitted to the Municipal Airport Commission by B Russell Shaw, Inc, airport engineers, of St Louis The engineers also submitted a second estimate, reducing the expenditures to $812,500 through incorporation of various changes to the plans and elimination of some of the principal provisions B Russell Shaw, head of the firm, estimated that two years will be necessary to complete the original plan as submitted The Airport Commission voted to submit it to the Air Board of the St Louis Chamber of Commerce for its consideration and to hold a subsequent meeting after a report has been received from the Air Board.

Open Seattle-Yakima Line

SEATTLE (WASH)—Passenger service between this city and Wenatchee, Ellensburg and Yakima was inaugurated Jan. 6 by Inter Citiair Express, using two planes, a Stinson Detroiter and Lockheed Vega The line will later be extended to Spokane.

Three Airport Fires Cause $164,000 Loss

NEW YORK (N. Y.)—Word has been received here of two recent fires which caused serious loss to the companies concerned. Damage estimated at $100,000 was caused by a fire in the hangar and administration building of Braley School of Flying, Wichita. Among the planes destroyed were three Beezle Bugs, experimental trainng planes built by Braley Aircraft Co., which had just been got ready for Department of Commerce tests. However, plans for rebuilding were made immediately, and the school was able to continue operations uninterrupted, thanks to assistance offered by Cessna Aircraft Company, Swallow Aircraft Company, the local unit of Universal System, and officials at the municipal airport.

Two planes of the Duplex Airways' hangar were destroyed by fire at Kellogg Airport, Battle Creek, Mich., as well as records and souvenirs collected by E. A. Goff, Jr. Damage was estimated at $30,000. This fire was reported to have been caused by a spark falling on the roof. The Braley fire originated in the engine repair department, but specific cause is unknown.

Damage claims against the city totaling $34,000 have been filed by Airways Transport Company and McMullen Aircraft Company as a sequel to the fire in the municipal hangar at Tampa, Fla., Dec. 12. City officials disclaim responsibility on the grounds that the companies did not pay rent for the hangar storage space.

Develops Machines For Oiling Runways

OMAHA (NEB.)—Dean Noyes, city commissioner, has developed a runway oiling machine to be used for maintenance of the Omaha Municipal Airport, and has two others in mind. The first, for which Mr. Noyes has applied for a patent, consists of an oiler similar to a seed drill, such as is used by farmers. The oil is fed into the ground as deep as 4 in. through steel pipes which follow double disks. The depth may be reduced to 2 in. for successive treatments.

The second machinery idea is for the mixing of oil and soil in a long trough, swung on an old caterpillar frame, and dragged by another caterpillar tractor. A fresno blade prepares the soil, and as it slides through the trough, the oil is fed into it, while the mixing is effected by 48 paddles, motivated by the tractor engine, to which the apparatus is attached by a universal joint. The third piece of machinery will be designed to smooth airport surfaces.

To Re-Issue N. Y. Blue Book

ALBANY (N. Y.)—The New York State Aviation Blue Book, first issued last spring, will be revised and re-issued this year, and will be issued annually hereafter, it is reported.

Michigan Mail Traffic Reported

CLEVELAND (OHIO) — Thompson Aeronautical Corp., with headquarters here, reports its planes carried 85 tons of mail in Michigan alone during 1929. Most of the total of 173,162 lb. for the year originated as follows: Detroit 51,275, Kalamazoo 10,987, Bay City 7,074, Pontiac 5,910, Grand Rapids 5,267, Saginaw 4,125, Muskegon 4,007, Lansing 3,263, Battle Creek 2,739, Jackson 2,519, Flint 2,213, Ann Arbor 1,585, Dearborn 605.

Airway Briefs

New England & Western Air Transportation Co., Bridgeport, Conn., plans to inaugurate twice daily round trip service between that city and Albany, N. Y., beginning Feb. 1, with intermediate stop at Hartford. The company has purchased a Ford plane.

City Council of Columbus, Ohio, has authorized only $12,800 of the $31,671 asked by Superintendent Center for operation of Port Columbus during 1930.

Midland (Tex.) Municipal Airport has been designated as an Army intermediate field, and the government will erect a hangar and radio building there.

Porterfield Aviation Interests, Inc., Kansas City, Kan., have made a bid for a 10-yr. lease of Falls City (Neb.) Municipal Airport.

Five aviation companies have already applied to William Templeton, superintendent for space at the new city airport at Vancouver, B. C.

A directional marker beacon, for use in connection with blind flying experiments, has been installed to bound one side of Mitchel Field, L. I., N. Y.

Appropriation of funds for lighting the New York-St. Louis airway is said to have been approved by the Congressional subcommittee on Department of Commerce appropriations.

Scheduled trans-oceanic air service within 10 yr. was predicted at a recent Electrical Association luncheon by William P. MacCracken, Jr., chairman of the board of NYRBA line.

Eagle Motor & Machine Works, Inc., will open a repair and machine shop in hangar No. 4, Love Field, Dallas, Tex. Southern Air Transport will move to the municipal hangar in front of which a master compass will be installed by the company.

Rate for the air-water-rail tour across the continent and down through the Panama Canal has been cut from $525 to $425 by T.A.T.

Del Rio, Tex., has acquired 126 acres for an airport.

Weather reports are now being broadcast from Galveston, Tex., by arrangement of Southern Air Transport with the Coast Artillery station there. The company also plans to establish stations at Atlanta, Ga., New Orleans, La., and Waco, Tex.

A total of 900,000 mi., in about 9,000 hr., was flown by planes of Curtiss-Wright Flying Service of Michigan during 1929. Sales for the year amounted to $100,000; there were 107 flying students, 55 ground students, and 102 enrolled for training as instructors, with 50 graduated to private licenses and 18 receiving limited commercial licenses.

Utica Municipal Airport reports that 56 students were registered there last year, with 20 receiving private pilots' licenses, 3 receiving limited commercial and 3 receiving transport licenses. About 5,000 passengers were carried by planes leaving the airport during the year, and no accidents were reported.

First passengers to complete the air-rail-water trip around the country by way of the T.A.T. route and Panama Canal, Mr. and Mrs. George W. Knopp, arrived back in Youngstown, Ohio, Jan. 6.

Western Air Express has opened a ticket office at St. Louis, Mo., to sell air-rail tickets to Los Angeles.

Offices of Boeing System in San Francisco have been moved to 320 Geary St., Hotel St. Francis.

Lights designed by Frank Peterson, of Denver Gas & Electric Co., have been installed at Cheyenne (Wyo.) airport.

Gains of about 25 per cent in traffic and 50 per cent in student activity were reported for 1929 at Oakland (Calif.) Municipal Airport.

Governor C. Douglas Buck of Delaware has appointed a commission to study the state's airport requirements and submit a report to the 1932 session of the legislature. Commissioners are Henry B. du Pont, Angus B. Echols and James R. Morford.

Colonial Flying Service has suspended flying activities at Utica, N. Y., until April 1.

Buffalo (N. Y.) City Council is considering the establishment of a seaplane base on the Georgia Street site recommended by Department of Commerce experts with improvements to cost about $250,000.

Wichita, Kan., has been made a regular stop on the T.A.T.-Maddux line, instead of a flag stop, as heretofore. Volume of business from Wichita is said to have increased considerably since the recent fare cut.

S.A.F.E. now makes a regular stop at Abilene, Tex.

Stout Air Lines has revised its schedules in co-operation with Erie railroad to provide air-rail service to Youngstown, Ohio, and intermediate points.

Seven round trips daily between Oakland Airport and San Francisco Ferry Building will be made by the speed-boat service inaugurated Jan. 15 by Western Water Taxi Co.

Several hundred copies of the New York *Times* are now flown daily from Jacksonville to Miami, Fla., by Roosevelt Flying Service planes and are thus placed on sale there about 6 hr. earlier than before.

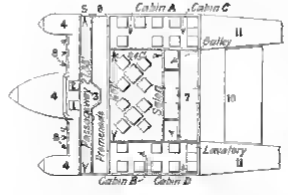
FOREIGN ACTIVITIES

Designers Emphasize Value of Racing Design

LONDON (ENGLAND)—The designers of the two seaplanes built for last year's Schneider Trophy contest have issued statements reviewing the progress in design represented in the results. R. J. Mitchell, who designed the winning Supermarine S-5, emphasizes particularly the improvements in shape of floats, which now require no shock absorbers and at the same time give improved hydro and aerodynamic efficiency, and also the development of streamline radiators for both oil and water cooling. He said that the Rolls-Royce engine used in the S-5 would have taken three times as long to develop under normal conditions.

H. P. Folland, designer of the Gloster-Napier VI, points to the very high speed per horsepower achieved in that plane. He also believes that in making the designs and testing the machines, as many data were obtained in two years as would normally be discovered in five or ten, and that the expense was no greater. Other valuable results, in his opinion, were the proof of the value of solid light alloy propellers, geared engines, and the reduction of drag. In addition to this, much was learned about problems of aerodynamic control at high speed.

New Interior Design



THE DB 70, BUILT by Dyle and Bacalan at Bourdeau from designs by M. de Monge [see AVIATION for Jan. 4], embodies a novel arrangement of the fuselage space. Two parallel cabins carrying 28 passengers are provided with a salon between. The diagram shows the layout, the various sections being identified by the following: 1 and 2—cockpits for first and second pilots, 3—navigator's quarters; 4—passage to engines; 5—passageway, 6—promenade, 7—hatch and ladder by which passengers may board the machine; 8—windows in the leading edge of the wing; 9—baggage compartments, 10—bracing; 11—lateral fuselage members.

Zeppelin Arctic Trip Cancelled

BERLIN (GERMANY)—Owing to failure to secure the necessary insurance, Aero Arctic Society announces that plans for an Arctic expedition in the Graf Zeppelin have been definitely abandoned for this year, though they may be taken up again at a later date. When the present overhaul is completed, the first extended trip to be made by the airship will probably be to South America, in May or June.

Germany Considers Air Rules

BERLIN (GERMANY) — Rules for the operation of aircraft are laid down in a bill which has been submitted to the Reichstag by the Reich Traffic Ministry. Among the more important are the following: an airplane passing another must pass on the right; when the paths of two planes cross, the machine on the right has the right of way, and the machine on the left may not give way merely by flying under; airships, balloons and gliders have the right of way over airplanes; planes must not be flown over crowds at height of less than 600 ft., nor over towns except at heights permitting safe landing outside the town limits or at an airport; planes must not be flown under bridges or electric wires, or over radio broadcasting stations; a plane making a forced landing shall if able signal with a red light.

Costes Sets Records With Load

1STRES (FRANCE)—Records for speed, distance, and endurance for a plane carrying 500 kilos (1,100 lb.) were apparently broken Jan. 18 by Dieudonne Costes and Jacques Codos in the Breguet plane "2", which was used by Costes and Bellonte in establishing a new distance record last summer. Unofficial figures indicate that Costes and Codos attained a speed of 210 km. per hr. (130 m.p.h.) as compared with the old record of 205 km. per hr. (127 m.p.h.). They covered over 4,000 km. as compared with the old record of 2,735 km., and they remained aloft for 23 hr. 22 min. 49 sec.

Finnish Co. Makes 1929 Report

HELSINGFORS (FINLAND)—Finnish Aero Co. planes covered 174,148 mi. in 1929, as compared with 163,509 mi. the previous year. Passengers carried increased from 8,157 to 9,114, and mail from 22,177 lb. to 36,790 lb. Amount of merchandise likewise increased from 85,784 lb. to 150,911 lb. The company operates three lines: Helsingfors-Tallinn, Helsingfors-Stockholm, Abo-Mariehamn-Stockholm. The figures also include 37,940 mi. of flying on special trips.

R. A. F. Acquiring Faster Types of Planes

LONDON (ENGLAND) — A big all-round increase in the speed of British Royal Air Force machines will result from re-equipment now in progress. Generally speaking, the R.A.F. is now passing from the 150 to the 180 m.p.h. stage. The classes of aircraft chiefly concerned are: single-seater fighters, interception fighters, fleet fighters, and day bombers.

A new fighter, with which four squadrons are being re-equipped, is the Bristol Bulldog, which with full service load has a speed of 174 m.p.h. at 15,000 ft. It takes only 27 min. to reach 26,500 ft., at which height it is still below its ceiling. The following is a performance comparison with the type it is replacing:

	Bulldog	Old Type
Speed at 10,000 ft.	174 m.p.h.	150 m.p.h.
Speed at 20,000 ft.	167 m.p.h.	134 m.p.h.
Climb to 20,000 ft.	14½ min.	19 min.
Service ceiling	27,000 ft.	23,000 ft.

Some fighter squadrons are equipped with interception planes, a class designed for rapid climb and high performance at the altitudes at which they would usually fight. A steady increase in the speed of day bombers has reduced the time between first warning of air raiders and the hour of their arrival over London, and this factor is one governing the design of the interceptor. Details of the latest interception planes are not divulged, but they are supposed to climb at a greater speed than the new fighters referred to in the foregoing.

To Decide Engine Types

It has not yet been decided whether the aircooled or watercooled engine is the best for fighters, and both have been adopted in order that in the next few years a prolonged test may decide the issue. In both classes the engines are very efficient, and the great increase in the speed of the fighter classes is due to improved engine design giving greater power for the same, or less weight and air-resistance, to the development of the supercharger, and to aerodynamical improvement directly due to the research which led to the victory in the Schneider Trophy contest last year. Minor improvements include wheelbrakes.

In the day bomber class the Hawker Hart, a machine exhibited at the Aero Show last year, has been adopted. It has a speed of 177½ m.p.h. at 5,000 ft., 172 m.p.h. at 10,000 ft., 163 m.p.h. at 15,000 ft., and 139 m.p.h. at 20,000 ft. It climbs to 15,000 ft. in 16 min. All these performance figures are the result of official tests.

Foreign Briefs

Four RAF planes started from London Jan 11 on the fifth annual round trip flight to Cape Town, South Africa. Fairey machines with Napier engines are used.

Several American firms will participate in the aviation exposition to be held in connection with the International Air Navigation Congress at Montevideo, Uruguay.

The Ford plane which was seized in connection with the patent suit started in Spanish courts by the Junkers company has been released under $15 000 bond.

Avions Morane-Saulnier are producing a new training plane, model M-S 300, with 120 hp Salmson engine.

Breguet aircraft company made a profit of 8,528,498 francs ($331,300) for 1928-29, and declared a dividend of 150 francs ($5 88) per share.

Compagnie Generale Aeropostale 1,000 franc bonds, at five per cent, were listed Dec. 13 on the Paris Stock Exchange. The issue amounts to 50,000,000 francs ($1,960,000).

Aero-Club of France has moved to larger quarters at 6-8, Rue Galilee, near Avenue Kleber, Paris.

Sir Charles Wakefield, prominent patron of British aviation, has been made a Baron, and Lady Mary Bailey has been designated as a member of the Order of the British Empire. Sir Hugh Trenchard, retiring Chief of the Air Staff, was also named Baron.

The Milan-Trent line operated by Societa Anonima Avio Linee Italiane has been extended to Bolzano.

R 100 recently attained a speed of 81.5 m.p.h., said to be the highest ever made by a dirigible.

About 350,000 pamphlets urging Italian farmers to increase wheat production were recently distributed by plane in the provinces of Florence and Pistoi, Italy.

Purchase of 3,000 tons of aluminum at $486 per ton is said to indicate important plans for the manufacture of aircraft by the Japanese government.

N. O. Carmichael, flying a Lockheed Vega with Wasp engine, recently covered the 252 mi. from Mazatlan to Torreon, Mexico, in 1 hr. 29 min. Robert B. Ewalt, also pilot for Corporacion Aeronautica de Transportes, S.A., flying the same make plane, covered 558 mi. between Mexico City and Torreon in 4 hr. 40 min., with stops at Leon, Agua Caliente, and Zacatecas.

Senator Henry Lemery of Martinique recently made a speech in Paris protesting against the "danger" of having American floating islands at various points around the world, and he recommended a conference to reach some international agreement on the subject before the first Armstrong seadrome is launched.

Planes operated by Corporacion Aeronautica de Transportes, S.A., covered 97,500 mi. in Mexico during December. Volume of mail increased 27 per cent, and passenger business increased 30 per cent over the previous month.

American aircraft entering Cuba must be licensed by the Department of Commerce, according to a reciprocal agreement recently made. Neither American planes nor pilots may engage in commercial aviation in Cuba without specific authorization from the aviation section of the Cuban War Department.

Since the wreck of the Fairey monoplane which was used in the attempt to fly from London to Cape Town was found on the far side of a range of the Atlas Mountains, it is believed that the machine was caught in a sudden severe down current of air.

Escuela de Aviacion Nacional, a private aviation school capitalized at $20,000, will begin giving instruction in Santo Domingo as soon as 25 students have enrolled, according to word received by the Department of Commerce. Two American planes have been secured.

The Dornier Super-Wal recently purchased by Japan Aerial Navigation Co. has completed its tests and will soon be placed in service between Tokio and Dairen.

Regular aerial service between Shanghai and Peking is soon to be inaugurated by the Chinese aviation bureau according to recent reports. Intermediate stops are scheduled at Pukow, Hsuchow, Tsinanfu and Tientsin.

Mr. Sun-fo has resigned as president of Chinese National Aviation Corporation. He is replaced by Mr. Wang-peh-chun, Minister of Communications.

An American picture called "Happy Landings," produced by Visugraphic Pictures, Inc., is being used for student instruction in China.

Three Curtiss Hawk planes, with Wasp engines, have been purchased through Curtiss Aeroplane Export Corp. by Cuban Army Air Service.

The French firms Breguet, Potez, Liore et Olivier, Hispano-Suiza and Renault have arranged to co-operate through the Air Union and Compagnie Aeropostale.

Warrant Officer Tomaso dal Molin, Italian Schneider Cup pilot, was killed Jan. 19 when his plane fell into Lake Desenzano.

Italy Reports Civil Aviation Aid

ROME (ITALY)—Expenditures by the Italian government for the development of civil aviation in 1929 amounted to 68,000,000 lire ($3,578,950), according to word received here by the U. S. Department of Commerce representative. During the first six months of the year, 800,021 mi. were flown by planes in regularly scheduled services, carrying 10,141 passengers, 16,207 tons of mail, 131,103 tons of baggage and 57,744 tons of merchandise. This was before the inauguration of the Turin-Milan-Rome line, which carried 100 passengers in its first month of operation.

Aircraft Operating Co. Plans Rhodesia Survey

LONDON (ENGLAND)—Detailed plans for the survey of 63,000 sq.mi. in northern Rhodesia [announced in AVIATION Dec. 28—Ed.] have been announced by Aircraft Operating Co., contractors. By the use of the specially built Gloster biplane, able to take off and climb to 10,000 ft. on either of its two Jupiter engines, or to climb to 21,000 ft. on both engines, it is believed that an area of 30,000 sq.mi. can be photographed from a single landing field with maximum safety. The twin-engined design also provides excellent visibility, and with three Williamson Eagle cameras, two of which are mounted on Eyrie frames, photographs can be taken from any angle without obstruction from any part of the plane.

The area to be photographed will first be covered by parallel strips of vertical overlapping photographs, taken from a height of 15,000 ft. and at intervals of 25 mi. Control strips upon which the final maps will be based will then be made by ground survey, in which prominent topographical features will be exactly located. Finally, the whole area will be photographed, using an oblique angle developed by this company in its Canadian survey work. From these final photographs, maps can be prepared with the aid of a special grid superimposed on them.

Aircraft Operating Co., which is not subsidized, has to date completed surveys with a total value of $648,000. Contracts have been signed for surveys to cost $531,000 more, and negotiations for an additional $1,044,000 worth of work are pending. An extensive survey of Rio de Janeiro and the Federal district of Brazil, at a cost of $607,500, is now in progress.

Mexican Aviation Co. Reports

MEXICO CITY (MEXICO) — Planes flying the four air routes which the Mexican Aviation Co. operates in Mexico carried 6,910 passengers, 189,211½ lb. of mail and 191,686½ lb. of baggage between Jan. 1 and Dec. 31, 1929, it is revealed by the company's annual report just issued. A total of 765,246½ mi. was flown and planes were in the air 8,435 hr. During the six months that the company has had express service 42,570 lb. were transported. The Company operates these routes: Mexico City - Tampico - Brownsville; Tampico-Tuxpan-Vera Cruz, Vera Cruz-Merida and Vera Cruz-Guatemala City.

French Sanitary Service Reported

PARIS (FRANCE) — Sanitary planes used by the French air forces in Morocco and Levant transported 239 people during 1928. For the period 1920-1929, a total of about 4,500 was transported in France, Algeria, Morocco and Levant. No accident occurred during 1928. In the Colonies, the chief drawback is the lack of large fields

WHAT OUR *Readers Say*

Railroad Bed Marking

TO THE EDITOR:

In line with the airways marking and my own observations while flying cross country, I would like to suggest that the railroads be induced to mark their road beds in a suitable manner so as to be visible from the air.

On the outskirts of towns and cities the letters of that particular railroad could be laid out with large stones and kept painted with the well known chrome yellow color, as for instance —N. Y. C.—New York Central.

These could be kept up with very little expense by the section hands and be a great help to pilots in checking up their positions on the map. This system could be gradually increased and have markings laid down every ten or twenty miles so that a pilot would not have to find a town to check his position.

WALTER E. LEES,
Aeronautical Service Engineer,
Packard Motor Car Co.

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Air Carriers and the Law

TO THE EDITOR:

Thank you very much for calling my attention to Mr. Parker's article on "Legal Responsibilities." ["Legal Responsibilities of Carriers of Goods and Baggage by Air," by Leo T. Parker, AVIATION, Nov. 9, 1929, p. 938.—Ed.] The only matter on which I take issue with him is in his statement that "a private carrier transports goods exclusively for himself *or one or two special firms or persons.*" I can see no reason why, if the matter is properly handled, any airplane company cannot avoid falling into the category of a common carrier even though doing business for far more than one or two special persons or firms.

In France, they are permitted to contract themselves out of a carrier's liability by statute, and, according to a case which was decided, several years ago, the French courts would have permitted them to do so without such statutory authorization.

In this connection, I will call your attention to the fact that Imperial Airways and K.L.M. both have clauses in their ticket contracts purporting to release them from liability to passengers.

Mr. Spaight of the legal department of the Air Ministry told me in June that there had not, up to that time, been any English decisions as to the validity of such agreements.

Fortunately, perhaps, for our companies, the first American decisions have arisen on the construction of the words "common carrier" in insurance policies; and the tendency has been to hold that the operator is not a common carrier where he does not operate on schedule or where he reserves the right to decline to carry certain classes or individuals.

A contract by which an air transport company is to avoid the status of common carrier must, of course, be carefully drawn. And even then if the company, for business reasons, does operate on schedule and hold itself out as ready and willing to carry anyone or any goods at a stated price, it will be a common carrier and will incur the obligations of such carrier. It may also be made a common carrier by statute, as has recently been done in New Mexico (Laws of 1929, Chapter 71, No. 6).

The big interstate air mail companies may very likely find it simpler to accept that status with its advantages and disadvantages. The small operator and the big taxi service companies, however, may well keep clear of it.

Even a common carrier may, in the absence of statute, avoid liability to a passenger carried free.

RAYMOND BALDWIN,
Boston, Mass.

Editorial Comment
FROM THE DAILY PRESS

Wotta Life! Wotta Life!

—THE (N. Y.) DAILY NEWS

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The Safety Problem in the Air

THOSE WHO WITNESSED the remarkable public demonstration of the Curtiss Tanager on Monday at Mitchel Field must have felt that the $100,000 prize check which was subsequently bestowed by the Guggenheim Fund upon its builders was anything but money wasted. It hopped into the air with a startling abruptness; it dropped gracefully to earth in a fashion really not unlike a sea gull taking the water and with hardly more "run." Less obvious from the ground was the aerodyoamic stability built into the plane, which gives it unusual powers of recovery from the errors of inexpert or careless piloting. It has been acclaimed as a fine example of what can be done if one starts to build all practicable safety factors into the conventional airplane design, and it does not seem rash to predict that, with the growing emphasis being placed upon safety by the designers, the Tanager will have an influence upon subsequent models in the various types of aircraft.

Yet it does not overcome "the nature of the beast," and it cannot be called "foolproof." "Moving masses," as the vice-president of the Guggenheim Fund said himself, "cannot be made foolproof." Old Man Kinetic Energy can always do damage to a fool." Aviators seldom tire of pointing out that "Old Man Kinetic Energy" destroys about 25,000 lives annually through the medium of the lowly automobile. It is desirable to recall the figure when discussing the safety of aircraft, yet it does not offer a fair comparison (considering the millions whom the same old gentleman daily transports in safety by the same vehicle), and few would be rash enough to say that it is not inherently more dangerous and more difficult to take off, navigate and land even in a Tanager than to start, steer and stop an automobile or a motorboat. A careless or inexpert pilot could smash the Tanager as well as another plane, and the consequences of tripping over a housetop are likely to be worse than those of tripping over a curbstone.

For this reason the public will hope

that even more radical improvements may be developed in the future One feels that in so far as safety is concerned the weakest point in aviation is the heavy burden placed upon human skill in piloting It may be that, given the nature of air and the continued existence of gravity, this is a problem beyond final solution but the hope is that one interesting effort toward safety will encourage aviation to concentrate its efforts upon some such goal.

—NEW YORK HERALD-TRIBUNE

New Volumes
FOR THE SHELVES

England's Air Defense

AIR DEFENSE, *by Major General E B Ashmore, British Army, Longmans, Green & Co , 179 pages, $3.40*

PROMPTLY upon the completion of peace at Versailles, both allied and central powers set to work upon the preparation of official histories of their various war activities. Inevitably they were encyclopaedic in content, and it is no discredit to their authors to say that most of them were unimaginably dull. Such works as Sir Walter Raleigh's Official History of the Royal Air Force were unhappily rare.

It has taken ten years for the seasoning influence of time and reflection to bring forth a lighter product applied to the defense of ground areas against air attacks Major General Ashmore's story of the defenses of London during the late war and of the plans for its defense in future (for it is to London that this volume is principally consigned) is neither heavy in avoirdupois nor heavy in style. He tells with simplicity and comparative brevity the story of the service that he commanded, and he tells it with as just an appraisal of credit between aircraft, anti-aircraft artillery, searchlights, balloon barrages and various other defensive instruments as could be hoped for

He does more than that He regards with perfect fairness both friend and enemy. There is no residue of war hate in the book. Major General Ashmore in fact presents the German argument in justification of the bombing of London as well as one of the German commanders could have done it for himself, while at the same time pointing out some of the weaknesses in the application of that argument as they appeared from the other side of the lines He gives unreserved praise to the courage, skill and chivalry of the great Zeppelin commanders, such as Mathy and Strasser

The story of the air defenses of Great Britain has much that is of interest to readers concerned with the development of American air power, although it is necessary always to be on guard against too broad an acceptance of analogy, and always to remember that differences of political and geographical situation may lead to very real differences in the problems of aeronautical organization here and in England. Confusion in emergency may manifest itself in any country, however, and General Ashmore gives a brilliant example of it in pointing out that at the outset of the war the army was assigned the task of protecting Great Britain's force against air attacks, while the navy was to guard London. Co-operation was intermittent and unsatisfactory, and it was only after unification of command of the ground defenses that satisfactory results were achieved. It was not until 1917 that General Ashmore was put in charge. He took command in no uncertain terms, and was able before the end of the war to bring air attacks on London virtually under control Upon May 14, 1918, according to the story which he recounts in considerable and interesting detail, he presented his report to the War cabinet and "hazarded a guess that though the Germans might come to London once again, our defenses could now make it too hot for them to repeat the attempt," which proved to be a substantially accurate prediction

The book is a purely military one, and has no concern for those whose interests in aeronautics are exclusively commercial No officer of the Air Corps the Coast Artillery, or of naval aviation should overlook it It is of course impossible to abstract here all the conclusions at which General Ashmore arrives, but two or three key points may be mentioned. In the first place he is very explicit in his determination that no one form of defense is sufficient in itself and that the co-ordination of airplanes, anti-aircraft artillery and searchlights under a central command is essential to success Furthermore he lays enormous stress upon the importance of a control system. In the final stages of the war, the system of reporting the movements of enemy aircraft was so perfected that General Ashmore sat in a raised gallery at headquarters overlooking a map of the London area upon which every enemy plane was represented by continuously moving markers reports being made within a minute of the observation, and with a row of telephones in front of him through which he could talk instantly to any anti-aircraft post or squadron headquarters. The use of radio on defending aircraft would further increase the importance of ground control and information in any future hostilities

Another point that stands out very strongly in Major General Ashmore's pages is the amazing difficulty of making contact in the air especially at night. Thus, for example, in one raid near the end of 1917, even with all the assistance that could be given by the ground control, 34 descending airplanes went up looking for 13 German bombers that came well over London and not a single one of the enemy machines was sighted by the British pilots, In another raid, 50 airplanes went out searching for 20 bombers and managed to make visual contact with four of them, but without getting near enough for combat in any case The lack of combats was of course partly due to the slowness and poor armament of most of the defending airplanes at that time —EDWARD P. WARNER, *Editor of* AVIATION.

Abstracts AND *Reviews*

Plumbing in Aircraft

PLUMBING AND HEATING IN THE SKIES, *by John F. Hardecker Article in* Domestic Engineering, *Oct. 19, 1929*

FACILITIES which will insure comfort as well as speed and safety to passengers using air transport are becoming increasingly important, and are undoubtedly going to receive much more attention from aircraft manufacturers than they have in the past Beginning with this very reasonable assumption, Mr. Hardecker summarizes some of the things which have already been done along these lines, describes various types of plumbing equipment which have been designed for use in aircraft, and urges specialists in plumbing fixtures to devote more attention to this subject

With strict limitations imposed both as to weight and space occupied, most of the toilet compartments in airplanes built up to the present time have been somewhat primitive in character. As the author points out, the luxurious porcelain fittings which are common in hotels and the like are out of the question in planes. Nickel alloy, however, furnishes an attractive material and some excellent fixtures have already been designed which use it. There is available, for example, a metal wash stand with soap container and hot and cold water faucets of the Pullman type which weighs only 5½ lb, and which is used on the Boeing 18-passenger transport plane Bowls may be had without fixtures which weigh as little as 1 lb. Water tanks holding 1 gal of cold water may be as light as 1½ lb, while a flat vertical tank of 3 gal. capacity, fitted with self closing faucet, weighs 6½ lb

Considerations of weight, together with government regulations prohibiting the discharge of waste, make the design of closets for aircraft even more difficult. However, several light weight chemical closets have been designed which Mr. Hardecker finds reasonably satisfactory A closet of polished metal or finished in black enamel, with mahogany seat and aluminum cover, which is used on both Ford and Boeing planes, weighs but 10 lb With another type of installation, the waste water from the lavatory is drained into the hopper of the closet. Otherwise, the waste from the lavatory may be discharged outside the plane, where it is converted to spray by the ship steam from the propeller

All forms of heating equipment described by the author utilize the exhaust from the engines as the source of heat. In most cases, the exhaust stack from the central engine (in the case of tri-engined planes) follows the under side of the fuselage, surrounded by a pipe open at the forward end to receive clean air, which when heated is diverted into the cabin through registers These may be controlled with simple valves, which automatically open a release valve to allow the hot air to escape from the rear of the jacketing pipe if it is not being used in the cabin.

The article concludes with a discussion of plumbing and heating for lighter-than-air craft. Since most of those built to date have been military rather than commercial, facilities have not received a great deal of attention On the Graf Zeppelin, Mr Hardecker says, passengers were frequently uncomfortably cold The new British dirigibles, R.100 and R 101, have carefully designed heating systems which are likely to prove more satisfactory Particularly interesting is the installation on R 101, which employs steam from the cooling system of the Beardmore engines, piped to various radiators in the passenger quarters

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Tube Buckling Tests

BUCKLING TESTS OF LIGHT-METAL TUBES, *By August Schroeder, N.A.C.A. Technical Memorandum No 525.*

IT HAS BEEN FOUND that centrally loaded light-metal tubes in the short column range do not behave uniformly under compression loads This report gives a mathematical derivation of the buckling strength curves of such tubes

It was believed that the changes in shape of tubes loaded as columns were not due alone to the elastic or plastic deformability of the material, but in part to the deformability of the tube as a whole Also, due to the various methods of producing the tubes, the properties of the material were not always the same For these reasons, it was believed to be necessary for the calculation of buckling strength curves, using Von Karman's theory which considers the stress distribution over the cross section of the members when in or near the straight condition, to conduct compression tests on specimens of the same cross-sectional shapes and dimensions as the members under investigation

Working on this basis, it was found possible to calculate with accuracy sufficient for ordinary work, the buckling strength curves for tubes of the various light-metal alloys (centrally loaded). Comparison of the compressive and tensile tests showed that the choice of the material for compression members on the basis of the results of tensile tests may, under certain conditions, lead to very wrong conclusions

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More Delicate Control

AUTOMATIC STEERING *(La Tenue du Cap Independente), by A-B Duval in L'Aeronautique, November, 1929.*

IF AN AIRPLANE left a wake behind it as does a ship, says M. Duval, ideas about piloting might be quite different. Particularly since an airplane is steered with the not very delicate muscles of the legs, it is almost certain to make continual slight deviations from its course, requiring continual correction In addition to increasing the error of position calculated from dead reckoning, these deviations mean that the plane must cover considerably more than the necessary minimum distance between two points.

Steamship companies have found it worth while to make expensive installations of gyroscopic steering devices on large vessels simply on the basis of coal saved by keeping an absolutely straight course The relatively high speed of the airplane, M Duval points out, leads it much farther off the course as a result of very slight movements of the controls

However, the author does not believe that the time has yet come for general use of automatic steering devices on airplanes. The weight is apt to be prohibitive, and the devices might interfere with the abrupt maneuvers directed by the pilot which are sometimes necessary For the present, he suggests that a delicate control through a reduction gear of large ratio, combined with an indicator which would at all times show the exact angle of the rudder, would serve the purpose satisfactorily. There would be, of course, simple means of disconnecting the gear and operating the controls directly in case of necessity. [The suggestion of a change of gear ratio to increase the delicacy of the rudder control in merely holding a straight course across country is a somewhat novel one, but other means for accomplishing the same result have been suggested Major Ocker, of the Air Corps, a number of years ago proposed the use of an auxiliary rudder of only one or two square feet of area to be controlled by independent means and to provide a sort of micrometer adjustment of the course during straight flight We are not aware that any extended trial of anything of the sort has been made —Ed]

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Wing Flutter

THE FLUTTER OF AEROPLANE WINGS, *By R. A. Frazer and W. J. Duncan, British Aero Research Com R & M, No. 1155*

DURING the past few years considerable work, both theoretical and experimental, has been carried out at the National Physical Laboratory on the subject of wing flutter This report is a detailed account of that work

The nature of the flutter was first observed by model tests. Under normal conditions it was of a "ternary" character involving both flexure and torsion of the wing and flapping of the ailerons. It occurred throughout definite ranges of wind speed, but it could be produced outside of those ranges as a result of disturbances of the air near the wing. The critical speeds limiting the ranges of flutter were not influenced by changes of wing incidence, but depended to a great extent upon the mass distribution and elastic stiffness of the wing-aileron system. It was definitely proved that flutter is due to instability of the wing system and not to resonance between the wing system and some external mechanical oscillator.

Having observed the nature of flutter, an attempt was made to derive mathematical equations for the motion

To make the problem tractable it was necessary to assume that the geometrical mode of deflection of the wing was independent of the wind speed which was virtually equivalent to the substitution for the real elastic wing of a fictitious "semi-rigid" one whose displacements followed definite laws irrespective of the wind speed It was assumed that the flutter was due to instability of the "fundamental" oscillation, and not of a "harmonic," the latter quite probably occurring only at speeds considerably above those attainable in flight. Only the normal displacements of the wing were held to be of importance as regards

flutter. Having made these assumptions, it was found possible to derive equations of motion for the wing-aileron system, and solving these, to determine the conditions necessary for stability. The aerodynamical derivatives were obtained experimentally in the wind tunnel.

As a check upon the work, the flutter characteristics of two wings, a small model and a light aeroplane wing of 9 ft span, were computed from the data obtained in the tunnel, and compared with the observed flutter. The agreement between the observed and calculated critical speeds (greatest error in the calculated values was 17 per cent of the observed speed) was sufficiently close to warrant the conclusion that the theory was adequate to the discussion of the flutter of cantilever wings. The work indicated, however, that the prediction of critical speeds was impossible in the absence of accurate test data, and such data being difficult to secure for a full-scale airplane, the reliable estimation of critical flutter speeds for actual aeroplanes is impractical.

However, the theory permitted a study of methods for the prevention of wing flutter. The object in this study was the elimination of flutter, not merely for all wing speeds, but also for all values of the elastic stiffness of the wing system. The difficulty in obtaining an accurate and certain value for the latter made it desirable that it be eliminated as a variable. The results of this study were presented in the form of a list of design recommendations which included all measures found to be favorable to the prevention of flutter. This list was divided into two groups, the first pertaining to the ailerons, the second to the wing structures.

Group I.

(a) The aileron control should be irreversible, that is, the pilot should be able to set the ailerons at any desirable angle and lock them in that position until he desires to move them. The gear between each aileron and its automatic lock should be stiff and free from backlash. Such a system would clearly prevent all types of flutter involving motion of the ailerons relative to the wings.

(b) The center of gravity of the aileron should be slightly ahead of its hinge. This could best be done by removing the hinge from the aileron leading edge and concentrating the mass forward. It is desirable that the mass of the aileron should be distributed along its span as uniformly as possible. When an inter-aileron strut is used, its mass should be viewed as evenly divided between the two ailerons so connected.

(c) The moment of inertia of the ailerons, and all parts of the control system moving with the ailerons, should be kept small.

(d) An appreciable part, preferably rather more than one-half, of the aileron should be inboard of the center line of the attachments of the outermost external wing bracing.

(e) The aileron motion should be heavily damped. This should be done only by a device of the fluid friction type, the use of solid friction being objectionable.

(f) The aileron should be definitely underbalanced aerodynamically. Tunnel tests indicated that a hinge placed at about 0.2 aileron chord from the aileron leading edge would be satisfactory.

Group II.

(g) The masses of the wing (in the case of monoplanes) or of each overhang (in the case of biplanes) should be balanced about its flexural axis.

(h) The flexural axis should be close to the axis of independence. (The axis of independence was defined as the position of the transverse axis for which the aerodynamical coupling disappeared, in the case of the flexural-torsional motion of the wing as a whole.)

(i) All elastic stiffnesses should be as large as possible. It should be noted that increase of a single stiffness may actually be detrimental; all members should be stiffened proportionally.

All of these features need not be adapted in any single design, but since the aileron usually plays an essential part in the flutter of actual aeroplane wings, it was thought probable that the utilizing of the recommendations regarding the ailerons would postpone flutter to extremely high wind speeds.

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Airfoil Characteristics

AERODYNAMIC CHARACTERISTICS OF TWENTY FOUR AIRFOILS AT HIGH SPEEDS, *By L. J. Briggs and H. L. Dryden*, N.A.C.A. Technical Report No. 319.

ALTHOUGH geared engines are being used more and more frequently in the heavier airplanes there is still some doubt as to the superiority of the geared types. In order to determine whether gearing is desirable, it is necessary to know the loss of efficiency due to high tip speeds and to compare this loss with that due to the use of gearing. This report is of interest because it presents the results of tests undertaken to determine the loss of efficiency of airfoils at the velocities attained by the tips of modern high speed propellers.

The airfoils tested were divided into four groups. The first was based on the R.A.F. section, the members of the group varying only in thickness. The second group was similarly based upon the Clark Y section. The third was again derived from the R.A.F. section, the primary variable this time being the position of the maximum ordinate. The fourth group consisted of a flat plate, a wedge, a circular arc, and a section representative of those used in the Reed Metal Propeller. All airfoil sections were of one inch chord and six inches in length. The characteristics were measured in an open-jet air stream 2 inches in diameter at speeds of 0.5, 0.65, 0.8, 0.95, and 1.08 times the speed of sound.

The report emphasized the fact that the flow at high speeds is of the same general appearance as burbling flow at low speeds, and just as no theory is available for the latter, so none has been developed for the high speed type of flow. Corrections for aspect ratio cannot be computed and the estimation of interference between blade elements of propellers cannot be based on the theory of induced drag. Therefore the results of the tests cannot be used for full-scale propeller computations, but are of value only for comparing the relative efficiencies of the airfoil sections tested.

The Clark Y family was found to be more efficient than the R.A.F. family when the thickness of the sections (sections of equal thickness being compared) was greater than 0.10 the chord. The thinner sections maintained their lift coefficients very well to the highest speeds, while the thicker sections showed a marked decrease in lift coefficient. The total lift actually decreased as the speed increased over a certain range. All sections showed a marked increase in drag coefficient with increasing speeds, the rate of increase rising rather abruptly at a speed well below the speed of sound. At high speeds, the maximum ordinate on thick sections should be moved back to secure the best results. The minimum drag is often thereby increased, but the drag at high lift coefficients is decreased, and at very high speeds the minimum drag is also decreased.

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Floating Aileron Tests

WIND TUNNEL TESTS ON A MODEL OF A MONOPLANE WING WITH FLOATING AILERONS, By Montgomery Knight and Millard J. Bamber, *N.A.C.A. Tech Note No. 316*.

FLOATING AILERONS consist of surfaces mounted in the vicinity of each wing tip and balanced both statically and aerodynamically about a lateral axis, so as to align themselves with the relative wind when the control stick or wheel is in the neutral position. Rolling moments are produced by turning one surface up and the other down with respect to the neutral position. Neglecting the interference effects between the wings and these surfaces, for a given lateral setting of the stick or wheel the rolling moment coefficient will be constant and the yawing moment will be zero for all angles of attack. This technical note reports the results of tests made to determine the actual effectiveness of such ailerons and the reduction in wing efficiency due to their use.

A rectangular airfoil of symmetrical profile section was fitted with rectangular ailerons of the same profile and chord as the wing. The axis of rotation of the ailerons was on the chord line 23.5 per cent of the chord back from the leading edge. The ailerons, and the rod connecting them, were statically balanced and free to turn as a unit in small bearings mounted at each end of the wing. The tests covered an angle of attack range from −2 deg to +35 deg, and aileron displacement angles of 0, ± 5 deg., ± 10 deg., ± 15 deg., and ± 20 deg. The quantities measured were the rolling and yawing moments, lift and drag forces, and the mean floating angle of the ailerons.

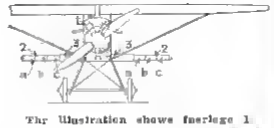
It was found that due to interference effects between the wing tips and the ailerons, the rolling moment was not constant for all angles of attack, but only roughly so. The greatest variation occurred near the angle of maximum lift, but the reduction in moment was not large even at that point. The yawing moments were not zero but they were relatively small in all cases, and negative at the larger angles of attack. The minimum drag of the wing with ailerons in the neutral position was more than twice that of the wing without ailerons. This condition, as well as the somewhat erratic behavior of the ailerons observed in this test, would probably be improved by the use of more suitable profile sections and plan forms.

New Patents

Airplane Wing Radiator

1,742,705. AIRPLANE AND RADIATOR THEREFOR. ALBERT S. HEINRICH, Freeport, N. Y. Filed Nov. 13, 1922. Serial No. 600,578. 11 Claims. (Cl. 244—31.)

ENGINE RADIATORS project from each side of the fuselage below the wing. Each radiator is designed to be built up of as many sections as desired, fastened end to end. Each section and each radiator as a whole has an airfoil shape for the purpose



The illustration shows fuselage 1, radiators 2, comprising units a b c, and housings 3.

of increasing the lifting power of the wings. When, for any reason, less radiating surface is desired, the radiators are intended to be slid into housings which connect the radiators to the fuselage. The housings are also of airfoil construction.

• • •

Heated Propeller

1,742,838. PROPELLER FOR AIRCRAFT. ALFRED G. SCHUMANN, Baltimore, Md. Filed Sept. 22, 1927. Serial No. 221,380. 2 Claims. (Cl. 170—172.)

PIPE CONNECTIONS from the exhaust ports of the engine lead to a chamber back of the propeller. The propeller blades are hollow and have inlet ports connecting with the chamber so that the hot exhaust gases may pass into the hollow blades. Exhaust ports are provided in each blade near the tip. The purpose of this device is to prevent formation of ice on the blades and reduce the resistance offered by the air to the rotation of the propeller.

• • •

Slit Propeller

1,742,762. AIR PROPELLER. KARL STAHL, Friedrichshafen, Germany, assignor to Luftschiffbau Zeppelin Gesellschaft mit beschränkter Haftung, Friedrichshafen, Germany. Filed Nov. 26, 1924. Serial No. 752,451, and in Germany Dec. 5, 1923. 3 Claims. (Cl. 170—160.)

A PROPELLER is provided for about one-third its length from the tip with a slit extending diagonally through from the front to the rear face. It is stated that the effect of such slit is that more air is led from the pressure side to the back of the blade with corresponding increase in efficiency. In a modified form, two blades may be fastened together one behind the other, to form a diagonal slit. In addition, the forward blade may also be provided with a diagonal slit extending one third its length from the tip.

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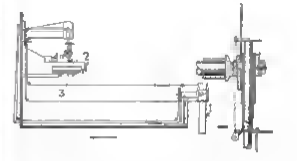
Flight Recording Mechanism

1,742,355. APPARATUS TO FACILITATE AERONAVIGATION. ARMIJO ORTELLO JESSEN, Valparaiso, Chile. Filed Aug. 13, 1925. Serial No. 50,123. 8 Claims. (Cl. 33—28.)

A UNIVERSALLY-MOUNTED telescope is sighted from the aircraft upon an object on the ground and the movements of the telescope are transmitted by cables and pulleys to a universally-mounted stylus operating on a recording chart. The chart is driven continuously by a spring-operated motor. A timing mechanism is caused to oscillate the stylus periodically to give an



The illustration shows telescope 1, stylus 2, spring motor 3, and electro-magnet 4 for oscillating the stylus.

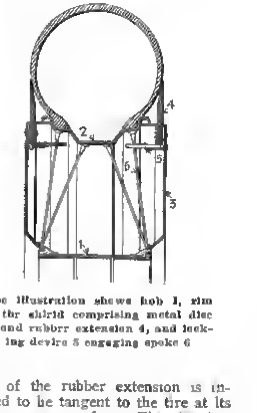
indication of elapsed time. A log is driven at a rate corresponding to the speed which is set manually. This data is read in conjunction with suitable scales.

• • •

Airplane Wheel Fairing

1,742,874. WINDSHIELD FOR VEHICLE WHEELS. CHARLES H. ROTH, Akron, Ohio, assignor to The Goodyear Tire & Rubber Company, Akron, Ohio, a Corporation of Ohio. Filed Feb. 21, 1928. Serial No. 255,845. 9 Claims. (Cl. 244—2.)

TO CUT DOWN the air resistance of the airplane wheels, a shield is provided between the hub and the extreme outside surface of the tire. This shield is formed of a metal disc fixed to the hub, and having a rubber extension around its edge. The outer



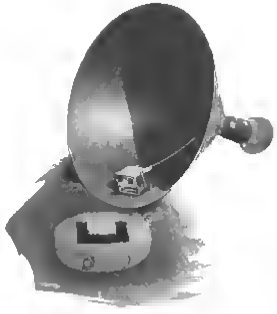
The illustration shows hub 1, rim 2, the shield comprising metal disc 3 and rubber extension 4, and locking device 5 engaging spoke 6.

edge of the rubber extension is intended to be tangent to the tire at its extreme outer surface. This disc has fixed to its inside surface several locking devices, each of which is designed to engage a spoke of the wheel. Each locking device is in the form of a toggle which may be operated through openings in the shield.

THE BUYER'S LOG BOOK

Curtiss Boundary Light

FURTHER AID to night landing planes is provided by the new type boundary light recently developed by engineers of the Curtiss Airports Corporation and the Curtiss Wright Flying Service, 27 West 57th Street, New York City. The light is supported by a cone which is held in place by its own weight. If struck it overturns easily disconnecting



Curtiss Landing Light

the wiring by pulling a plug through a flexible cable from a weatherproofed cutout. Breaking the contact closes the electric circuit automatically without affecting other lights on the same system.

Reiff & Nestor Reamer

A NEW REAMER which is effective in aligning for reaming connecting rod bushings or any other single bushing job has recently been placed on the market by Reiff & Nestor Company, Lykens, Pa. No. 90 and 91 types have a self-feeding section on the end of the blades which breaks up glazed surface on old bushings, prevents chatter and saves the reamer from dulling. The reamer is ground with inserted plug slightly expanded, producing a true circle of cutting edges and insuring a round, smooth hole with maximum bearing surface.

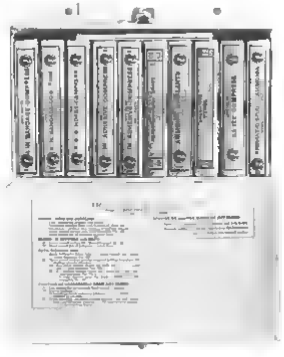
A special feature is the floating pilot which locks up the work in positive alignment and adjusts itself to undersize bushings. This is made with double end tapers, the long end being .025 under to .040 over standard size and the short end .005 under to .040 over standard size. The short end of the pilot should be used whenever it is possible to insert it between the pilot and bushing securely. When reaming piston or rod bushings with the new No. 90, 91 or 95 reamers, the floating pilot should be used at all times.

Course and Distance Finder

THE 10-Seconds Course & Distance Finder Company, Greenwich, Conn., supplies for use on airplanes and boats a new device consisting of a transparent compass dial in combination with a tape scaled to any desired chart. The tape has on one side a 1/80,000 nautical mile scale covering most of the cruising charts of the Atlantic and Gulf coasts, and the other side is left blank so that any scale can be made.

Davis Air-Kit

A FIRST AID KIT for passenger carrying airplanes has recently been offered by Bullard-Davis Inc., 67 Wall Street, New York City. The kit contains individual dressings in unit cartons, the contents being visible. Pictorial instructions for different types of treatment appear on each unit carton.



No. 10 Air-kit

This equipment is furnished in various sizes ranging from No. 10 to No. 60 the designation on the kit indicating the number of units which it contains. Special assortments are obtainable to meet individual requirements.

TRADE CATALOGS

BEARING SERVICE. A folder recently published by the Federal-Mogul Corporation outlines the bearing and bushing service of this company and includes a discussion of the factors governing bearing selection. A list of their line of bearings and bushings is also included.

AIRPORT SERVICE EQUIPMENT. A circular on airport service equipment entitled "Super-Service and the Modern Airport" has just been issued by the Hobart Brothers Company. The six different forms of equipment illustrated and described include battery service, electrical service, hydraulic washing, spray painting, tire and free air service and general repairing.

Fafnir Aircraft Bearings

A LINE OF BALL BEARINGS for aircraft has been recently introduced by the Fafnir Bearing Company, New Britain, Conn. Bearings for various points in the control system are supplied in metric sizes, of the single row radial single and double row radial thrust and other types. Airplane wheel bearings have dimensions conforming to the tentative standards set by the S.A.E. and are of the full type, angular contact design to provide maximum radial and thrust capacity against the loads and shocks of wheel service. Rings and balls are of chrome-molybdenum steel heat treated.

A complete line of bearings for airplane engines is manufactured by the company, including narrow width bearings for crankshafts, full type radial and angular contact construction for rocker arms and special high speed retainers for superchargers and starters. For instruments and radio equipment small, light, high precision bearings of standard types are available.

Williams Wrench Set

THE NEW "VOLUME" wrench set No. VA now being produced by J. H. Williams & Company, Buffalo, N. Y., consists of six wrenches held in a metal container by tension. Each wrench is drop-forged and made of chrome-molybdenum steel, chrome plated. The twelve different openings provide for all S.A.E. Standard nuts and cap screws ¼ to 11/16, U. S. Standard nuts ¼ to ⅞ in. and cap screws ⅜ to ¾ in. Wrenches may be removed without disturbing others.

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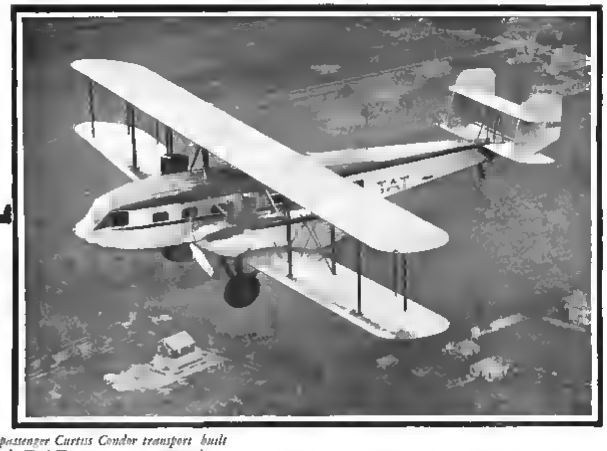

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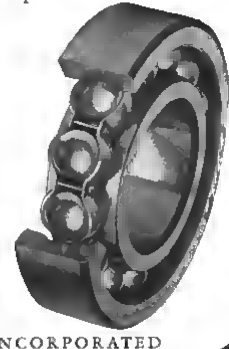

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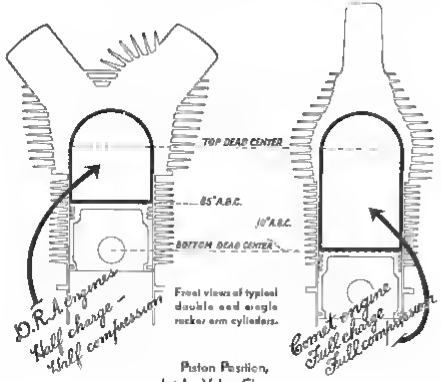


Front views of typical double and single rocker arm cylinders.

Piston Position, Intake Valve Closing, Engine Cold.

GLIDE in for a landing—from one, five, ten thousand feet—with the throttle completely closed—no need to "gun" the engine constantly to keep it warm—the Comet will not "conk out" just when you need positive power for a safe landing—that common fault is eliminated in the basic design of the valve gear.

WHY?

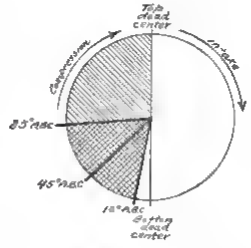
All cylinders "grow" in height as they warm up, and contract as they cool. This change alters the valve clearances and the valve timing. Most conventional engines make no attempt to compensate for this change. Their intake valves close later when cold than when hot—about 85 degrees after bottom dead center, instead of 45 degrees after. The full charge drawn into the cylinder is partially blown out on the compression stroke, and the remaining mixture is only half compressed. The weak explosions resulting are frequently insufficient to give quick acceleration, and the engine "conks out" just when safety demands instant power. And that is when the Comet valve gear has its advantage.

Look at the sketches.

Because of the single rocker arm action, the Comet intake valve closes earlier when cold than when hot—10 degrees after bottom dead center instead of 45 degrees after. With the engine cold, a full charge gets full compression. Positive, powerful explosions result. The engine "takes the gun" even after the cylinders are thoroughly cooled during a long glide.

The same action helps in starting. The priming charge is fully compressed and exploded. Even on the coldest days Comet engines start with ease. No delays. No broken engagements.

The single rocker arm valve gear, found only on the Comet, is the safeguard against engine failure. It assures positive power when power is most needed. It is another reason why owners of Comet engines are



Showing relative intake valve closing of uncompensated double rocker arm engines (approx. 85° A.B.C.) and Comet single rocker arm engine (10° A.B.C.), when both engines are "cold". When "hot" practically all engines close intake valves approximately 45° A.B.C. Cross hatched segment shows extra charge and compression obtained through the Comet single rocker arm valve gear.

at ease in the air

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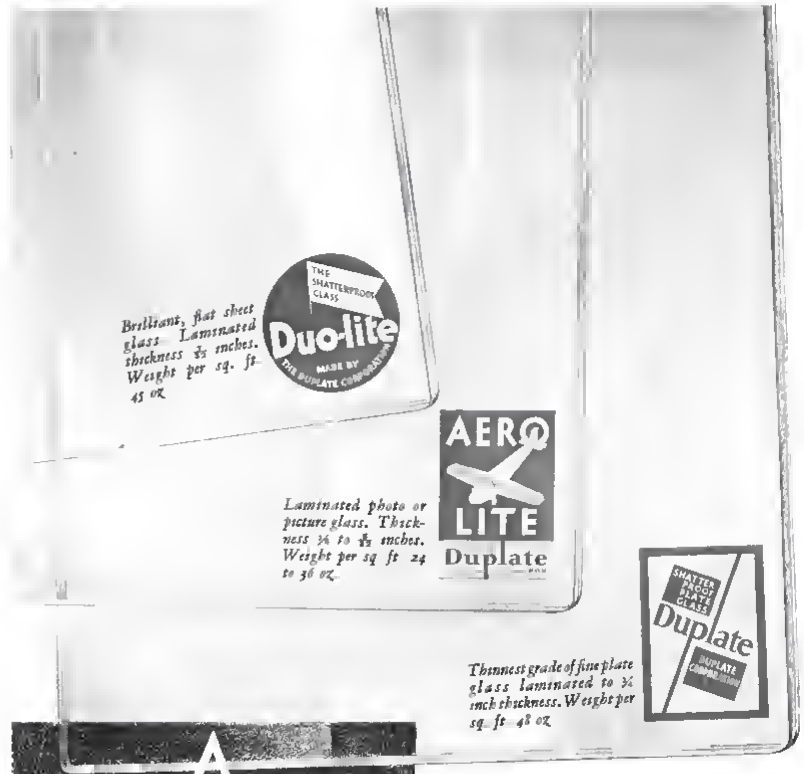

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WITH bare hands, the plowman fought for his food. Hunger harried him . . . bent his back, bowed his head.

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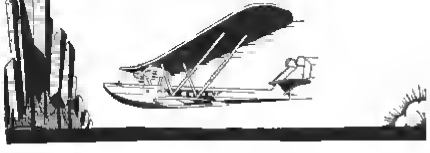

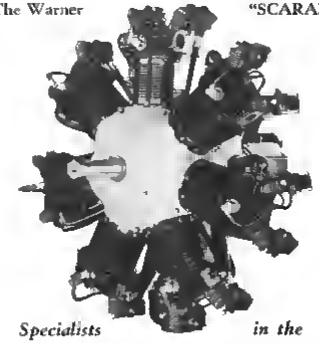

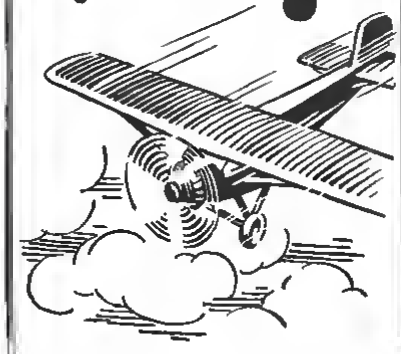

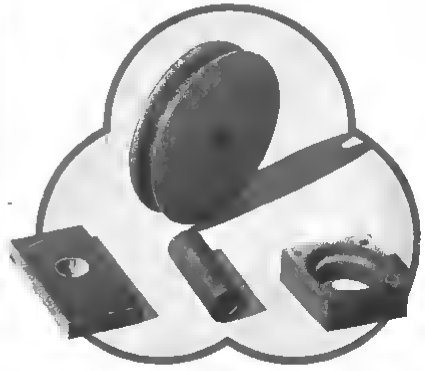

Bakelite Laminated parts used on airplanes made by Consolidated Aircraft Corporation Buffalo N Y

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1—Siemens Hamilton Wood	58
5—Challenger Supreme Wood	75
4—Hisso "A" Supreme Wood	75
2—OX-5 Hamilton Steel	220
8—Warner Hamilton Steel	215
7—Challenger Hamilton Steel	280
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Brand new, Only five hours flying time, including ferrying from factory $3,750 Cash Reducing equipment

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2—J-5 Wright Whirlwinds
1—Kinner
2—Warner Scarab
1—Velie sixty
1—Model E Hispano
1—Model A Hispano
2—H-3 Hispano
1—OXX-6 Curtiss
4—OX-5 Curtiss
1—110 hp Anzani
1—45 hp Anzani

Write for information and prices.

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2—Block test rebuilt special piston Miller rockers, 1500 R.P.M., @ $500 00
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FOR SALE One Hisso A Swallow new never cracked up many extras, sacrifice. One OX-5 Swallow training plane excellent condition One new Swallow TP with Kinner motor These ships are in first-class condition and priced to sell Wire or write Hoch Aviation Company Butler, Pa

FOR SALE One four-cylinder 50-hp Roberts aviation motor, $435 one 6-cylinder 75 hp Roberts aviation motor $80 F X Burger 1409 South Jefferson Ave., St Louis, Mo

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FOR SALE One 90 hp LeBlond motor Like new Fifteen hours time. Price $850 Invincible Metal Furniture Company, Aircraft Division, Manitowoc, Wisconsin

FOR SALE Swallow OX-5 3 place 100 hours, good condition any reasonable offer Chad bourne Ridgewood N J Phone 3780

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RYAN B-1 J5CA 207 hours, 7 hours since steel overhaul First class shape Always kept in hangar $5,500 cash 4145 Helen Detroit Mich

RYAN Brougham in good condition, motor recently overhauled Bargain price. Cleveland Pneumatic Tool Co. Cleveland Ohio

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WACO 10 year old 175 hours, good shape, $1,375 quick sale Curtis Orlole-E Hisso motor completely overhauled Looks like new Take car on this Grant Cheneweth Garage Huntington Ind

ZENITH L-7 carburetor $15 60 hp LeRhone prop $45 turnbuckles 3½ in and 4½ in 10c and 15c. Speeditex B glider fabric 30c yard 36 in. wide Pinked 2 in tape 4c yd Joe Edelsky Aircraft 1727 11th Ave So Minneapolis Minn

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WANTED One OX-5 one three-cylinder Anzani or small radial motor and one small monoplane. Equipment to be used for instruction purposes only Airworthiness of no importance but must be complete Give details and price Trenton Princeton Airport, R.D No 4 Trenton, N J

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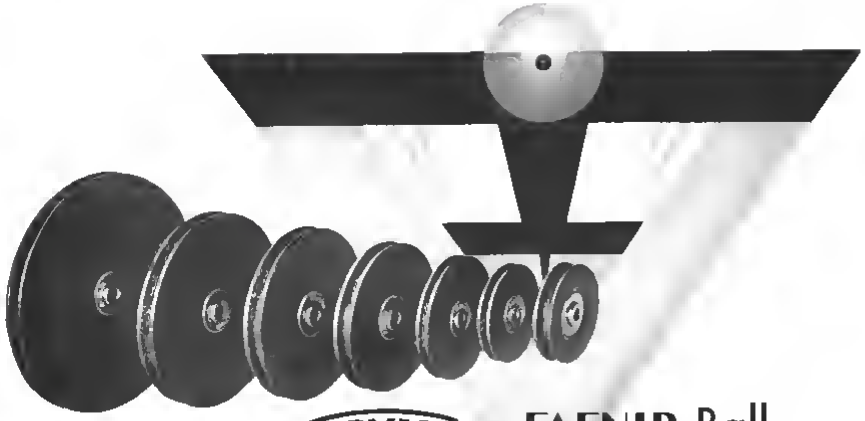

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BALTIMORE, MARYLAND

Port	Line	Fare	SCHEDULE Lv.	SCHEDULE Ar	RETURN Lv	RETURN Ar	Air Miles	Plane	Seats	Motor
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ALBUQUERQUE, N MEX	Western Air Express	o w $95.00 r t 190.00	8 30 C T	6 10 M T	10 45 M T	6 10 C T		Fokker F-10-A	12	3 Wasps 1275 H P
AMARILLO, TEXAS	Western Air Express	o w $60.00 r t 120.00	8 30 C T	1 00 C T	4 20 C T	6 10 C T		*Fokker F-10-A	12	3 Wasps 1275 H P
BARTLESVILLE, OKLA	Central	o w $30.00 r t 60.00	9 00 At Wichita 6 hrs 6 10	S D S 6 30	8 40 1 10	11 30 6 20	278	Travel Air	5	Wasp 425 H P
BRECKENRIDGE TEXAS	Central-Braniff	o w $56.00 r t 112.00	9 00 At Wichita 6 hrs 1 10 OvT Okla City	S D S 11 45	9 40 Via Tulsa or OvT Okla City	6 20 11 30	534 via O C 636 via Tulsa	Travel Air Hamilton Fairchild	5 6 6	Wasp 425 H P; Wasp 425 H P; Wasp 425 H P
CHICAGO, ILL	Universal	o w $55.75 r t 106.50	12 20	6 12	9 15	6 10	429	Fokker F-10-A	12	3 Wasps 1275 H P
CLEVELAND, OHIO	Universal	o w $[illegible] r t [illegible]	12 10	7 45	7 10	3 10	719	Fokker F-10-A	12	3 Wasps 1275 H P

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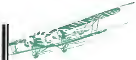

OKLAHOMA CITY, OKLA	Central-Braniff	o w $33.00 r t 66.00	9 00 At Wichita 6 hrs 1 10	(S D S T) 7 10	7 30	11 30	325	Travel Air	5	Wasp 425 H P
OMAHA NEB	Universal	o w $23.00 r t 48.00	10 15	12 30	1 10	6 30	190	Ryan Brougham Fokker Super Universal	4 6	Wasp 425 H P; Wasp 425 H P
PEORIA, ILL	Universal	o w $48.25 r t 96.25	12 30 At St Louis 1½ hrs	6 30	7 25 At St Louis 2 hrs	2 11	391	Ryan Brougham Fokker Super Universal	4 6	Wasp 425 H P; Wasp 425 H P
PONCA CITY, OKLA	Central	o w $23.50 r t 47.00	9 00 At Wichita 5 hrs 6 10	(S D S T) 6 30	5 30	11 30	230	Travel Air	5	Wasp 425 H P
ST LOUIS, MO	Universal	o w $32.00 r t 60.00	12 20 1 10	6 45 6 30	7 25 11 10	10 30 6 45	235	Ryan Brougham Fokker Super Universal	4 6	Wasp 425 H P
ST PAUL, MINN	Yellow Cab Airways	o w $33.00 r t 66.00	9 00	6 30	9 00	1 30		Fairchild	6	Wasp 425 H P
SAN ANGELO, TEXAS	Central-Braniff	o w $72.50 r t 145.00	9 00 At Wichita 5 hrs 1 10 OvT Okla City or Tulsa	S D S T 1 20	8 00 Via Tulsa or OvT Okla City	5 20 11 30	660	Travel Air Hamilton Fairchild Fokker F-10-A	[illegible] 12	Wasp 425 H P; Wasp 425 H P; Wasp 425 H P; 3 Wasps 1275 H P
SALINA KAS	U S Airways	o w $14.00 r t 22.40	9 00	10 25	2 30	4 10	158	Flamingo	7	Wasp 425 H P
SEMINOLE OKLA Via S A F E Way Tulsa S D S	Central-Braniff	o w $41.00 r t 82.00	9 00 At Wichita 6 hrs 6 10 OvT Okla City or Tulsa	(S D S T) 4 40 6 20	8 30 Via Tulsa (S D S T)	1 30	365 via O C 297 via Tulsa	Travel Air Hamilton Fairchild Fokker F-10-A	5 [illegible] 12	Wasp 425 H P; 3 Wasps 1275 H P
SPRINGFIELD, ILL	Universal	o w $40.75 r t 76.00	12 25 At St Louis 1½ hrs	6 10	8 15 At St Louis 2 hrs	6 11	406	Ryan Brougham Fokker Super Universal	4 6	Wasp 425 H P
Subject to change without notice. For latest information call Air Travel Bureau HArrison 0130										
SWEETWATER TEXAS	S A F E WAY	o w $60.00 r t 120.00	9 30	6 30	8 15	6 30		Ford All Metal	14	3 Wasps 1075 H P
TOPEKA, KAS	U S Airways	o w $7.00 r t 14.00	9 [illegible]	9 20	6 30	6 30	56	Travel Air	5	Wasp 425 H P
TULSA, OKLA	S A F E WAY	o w $22.10 r t 44.00	9 30	10 30	12 30	6 30		Ford All Metal	14	3 Wasps 1275 H P
TULSA, OKLA	Central	o w $30.00 r t 30.00	9 [illegible] At Wichita 6 hrs 1 10	S D S T 5 30	[illegible] 30 6 30	11 30 6 30	315	Travel Air	5	Wasp 425 H P
WAYNOKA, OKLA	Transcontinental Air Transport	For Rates Call Air Travel Bureau	3 30	5 30	8 55	11 43		Ford All Metal	10	3 Wasps 1275 H P
WEWOKA, OKLA Via S A F E Way Tulsa S D S T	Central-Braniff	o w $38.50 r t 30.00	9 00 At Wichita 5 hrs 6 10 OvT Okla City or Tulsa	(S D S T) 9 00	8 00 At Tulsa 6¼ hrs	6 30	397 via O C 385 via Tulsa	Travel Air Hamilton Fairchild Fokker F 10-A	5 [illegible] 12	Wasp 425 H P; Wasp 425 H P; Wasp 425 H P; 3 Wasps 1275 H P
WICHITA, KAS	Transcontinental Air Transport	For Rates Call Air Travel Bureau	6 30	4 30	15 10	11 43	175	Ford All Metal	10	3 Wasps 1275 H P
WICHITA, KAS	Western Air Express	o w $25.00 r t 30.00	8 30	10 20	6 30	5 10	175	Fokker F 10-A	[illegible]	1 Wasps 1275 H P
WICHITA, KAS	Central	o w $17.50 r t 30.00	9 00 1 10	11 30 3 30	9 30 4 30	11 30 6 30	175	Travel Air	[illegible]	Wasp 420 H P
WICHITA FALLS, TEXAS Via Wichita and Okla City S D S Universal	S A F E, WAY	o w $45.00 r t 30.30	9 30	6 10	9 45	2 30		Ford All Metal	[illegible]	3 Wasps 425 H P

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